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# RADIO

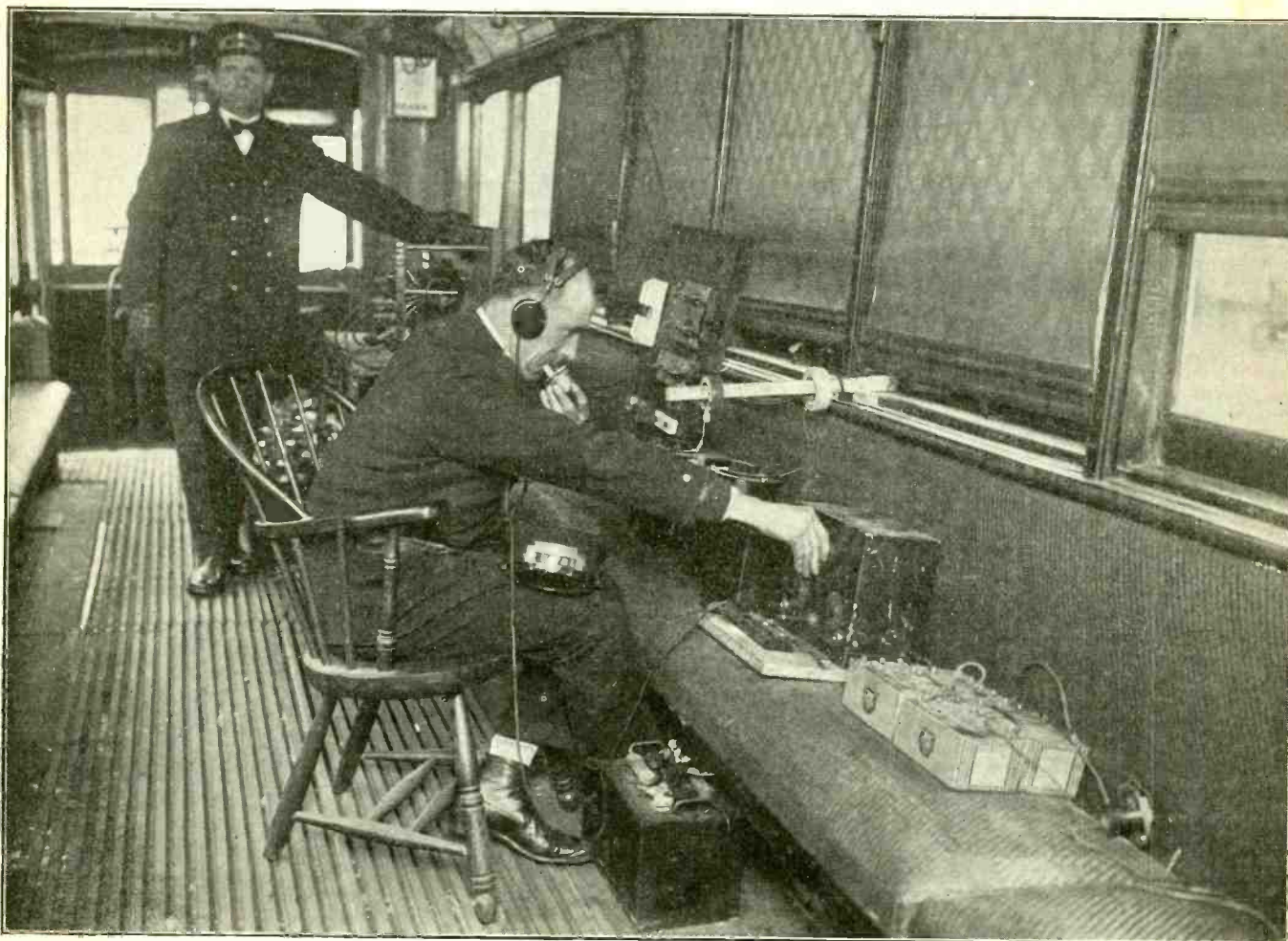
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Report of Second Radio Conference (See Inside)

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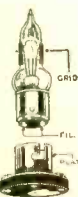
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VOLUME THREE OF  
**RADIO WORLD**

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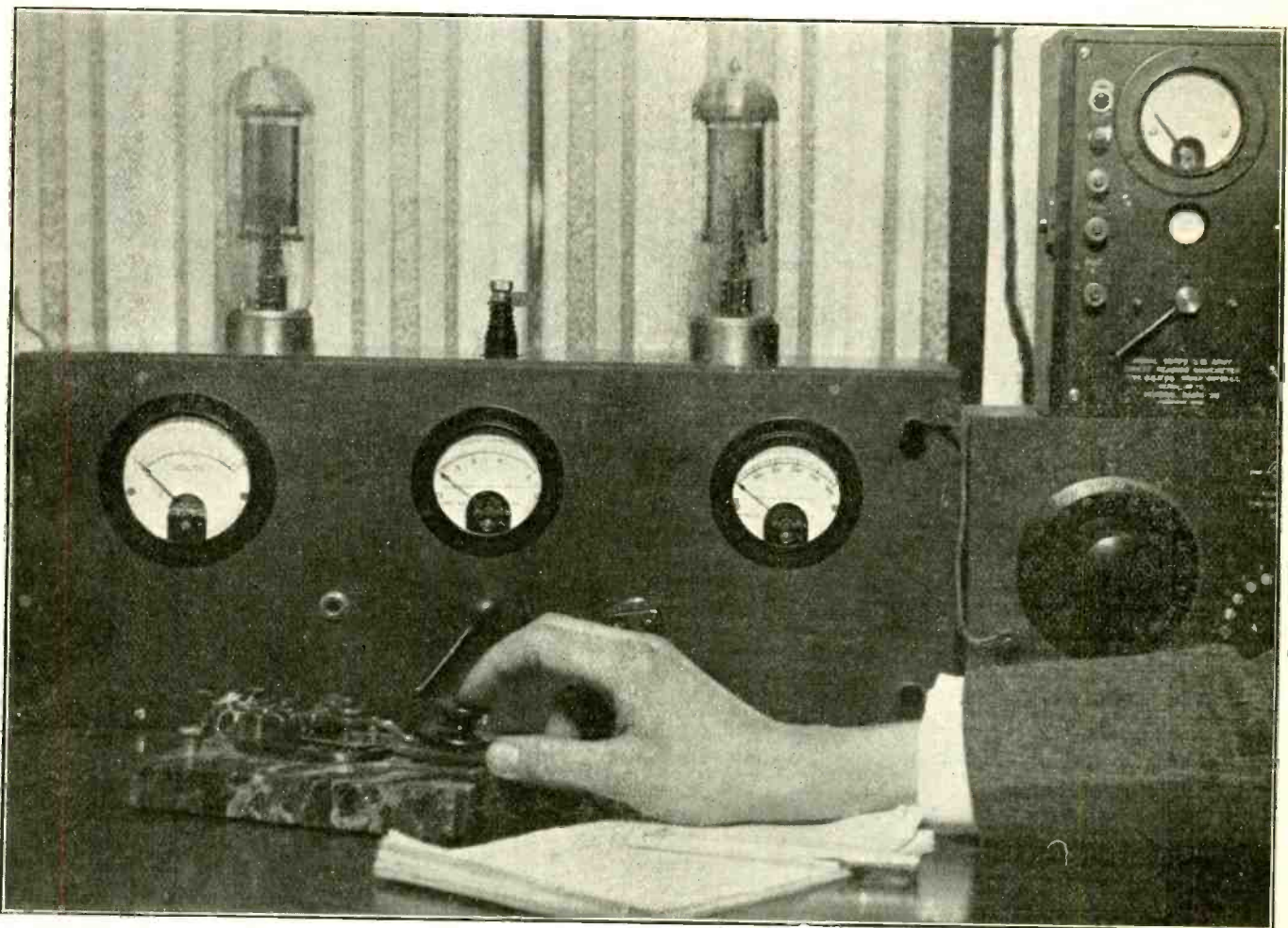
## Amateur Builds 2,500 Mile Transmitter

By John Kent

**M**UCH attention in the past has been paid to receiving sets and very little to transmitters, although they are just as interesting and, to a great many experimenters, are far more intriguing.

The transmitter illustrated herewith was built by

from transmitting to receiving with a flip of the hand. The receiver is shown connected to the right hand binding posts of the set. On either side of the switch are shown two jacks by means of which either chopper or key can be used for either ICW or straight CW.



(C. Photonews, N. Y.)

Extremely neat and compact 150 watt transmitter constructed by Mr. Paul Haus of New York City, which has covered 2,500 miles. It can transmit either interrupted CW or straight CW.

Paul Haus, a New York amateur whose call is 2VK. The set incorporates several novel features which would benefit prospective builders of transmitters. The set proper is rated at 150 watts and has a reliable working range of 1,500 miles, but reports have been received that show he has been heard 2,500 miles away.

As shown in the illustration, the antenna is connected directly over the center meter of the set and serves as the antenna for both the receiver and transmitter, change-over being made by means of the switch directly under the meter. This switch is a converted Amrad throw switch and it is possible to throw directly

The three meters are the voltmeter, thermo-ammeter and milliammeter, by means of which accurate check can be kept on the working of the set. It uses two 50 watt tubes which are located on top of the cabinet. The Heising system is used, changed to accommodate the builder's needs for CW instead of voice.

A point of note is the direct reading wavemeter located directly next to the transmitter and on top of the receiver. By means of the wavemeter, you don't need to "guess your wave is O. K." but your conscience will never bother you because all you have to do is switch it on and tell.

# A Novel Three Tube Reflex Receiver

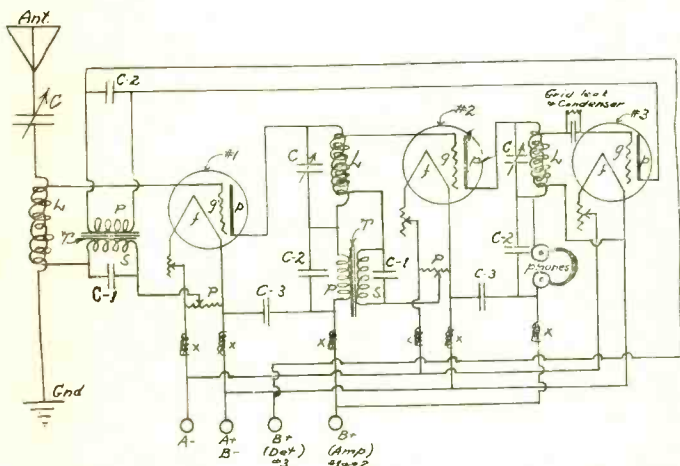
By C. White, Consulting Engineer

**R**ADIO WORLD for Feb. 17, 1923, contains a single tube reflex circuit of my design. The circuit used one tube of combined radio- and audio-frequency amplification and a crystal detector. Many of my amateur friends after giving the circuit a good trial wrote me asking for the extension of the theory to more than one tube. At first there were many obstacles in accomplishing the desired design, but after a little experimenting I have been able to design the circuit that so many fans have been urgently requesting. Although from the diagram the average fan may think that the solution is rather long and complicated, still, the circuit is the most simple, reliable, and economical reflex for amateur use. If the circuit were simplified any more it would cease to be reliable although the price would be lowered. The number of controls have been reduced to a minimum and by the employment of the choke coils (x in the diagram) serious feed-back and oscillation trouble has been effectively avoided. The use of coupling between the tuned

T stands for primary and S for secondary. A potentiometer is placed across the "A" battery in order to be able to afford an ample adjustment of negative potential for the grid circuits of the amplifying tubes No. 1 and No. 2. The potentiometers P should have a resistance of 250 or 300 ohms apiece. The choke coils X should have an inductance of .1 henry and the audio and radio by-pass condenser C-3 has a capacity of .25 mfd. The condensers C-2 are radio-frequency by-pass condensers with a capacity of .001 mfd. A grid leak and grid leak condenser is provided for the grid of the detector tube instead of a potentiometer as used on the grid of the amplifying tubes. Two separate "B" plus terminals are illustrated, one for the detector plate potential supply and the other for the amplifiers plate potential supply. This is feasible because the detector operates at a different plate voltage from the amplifiers.

After careful analysis the amateur fan will discover that this circuit is really simple and after a little experience he will find that its operation is just as simple and reliable. Those who have ever operated reflex circuits notice when starting the set that they do not get the accustomed volume; then all of a sudden, with a slight movement of some control, the volume swells to normal. The cause of this is the fact that at first the tendency of the tubes is not to act reflex but only to amplify the radio-frequency waves. Then the disturbance of the circuit causes the tubes to revert to reflex action. When starting a reflex receiver it is good practice to give it a "crank" just as you would crank your automobile. This cranking is performed by short-circuiting the phone terminals for a second and then removing the short. By this action the tubes are forced into reflex amplifying and once the circuit is started it will not fall out of "step" unless one or more of the tubes start in oscillation, which is next to impossible with a carefully constructed receiver using the illustrated circuit. In assembling and trying out care should be exercised to test out the transformer primary and secondary connections. By connecting up the transformer as the manufacturer recommends the trouble of getting the coils in backward will be avoided.

Now for a word as to tubes. Do not attempt to use the WD-11 or like type of designed tube in this receiver and expect to get anything more than mediocre results. Such types of tubes have their elements spaced very closely and the radio-frequency amplification capable of being obtained from them is exceedingly small. Without doubt the best tubes to use in this circuit are the new UV201-A Radiotrons or C-301-A Cunninghams. Owing to the large size elements and high vacuum and other desirable characteristics these models are without peers for a reflex receiver. Then again, their low current consumption makes it possible to operate the three tubes with about 25 to 35% less current than one of the older models of the same type. Although these tubes are rated to take five volts at .25 ampere, I have found that they operate very satisfactorily with only four volts on the filament and a much lower current. The high vacuum makes the tube quite noiseless as a detector and highly desirable for this reason in a reflex circuit. Those who have already built this circuit or a similar one say that they would not trade it for any other, no matter what the cost. For distant work it can not be beat.



Circuit described by Mr. White in the accompanying text. This circuit, by the use of the double wound coil L, eliminates one of the controls heretofore supposed to be necessary.

plate circuit of the first and second and the second and third tubes has greatly facilitated the control and operation of the receiver.

As illustrated in the diagram herewith the circuit consists of a main tuning circuit with a variable condenser C and a tuning inductance L. The tuning inductance L is made up of two coils wound one on top of the other, on a 3½ or four-inch tube. The primary coil is wound on the tube with No. 22 D.C.C. magnet wire and has 50 turns. The secondary is wound on top with the same size wire having 40 turns. By the use of these coils the advantages of a coupled circuit are partially realized and the trouble of coupling adjustment and the cost of varicouplers are avoided. Then again, it has also been found from experiment that this receiver functions satisfactorily with the fixed coupling. All the coils marked L are constructed in an identical manner and all the condensers C are 23 plate variables. The condenser C-1 is a .00025 mfd. mica condenser and is used to by-pass the radio-frequency waves across the high impedance secondary of the audi-frequency transformer T. The letter P on the transformer labeled

(Continued from preceding page)

The following are the wave allocations recommended by the conference:

Wave Frequency	Wave Length	Service.
Kilocycles per sec'd.	Meters.	
Above 2300	Below 130	Reserved.
2300	130	Government, CW, exclusive.
2300	130	Reserved.
2100	143	
2100	143	Government, CW, exclusive.
2100	143	Reserved.
2000	150	Amateur, CW, ICW, Ph, exclusive.
1700	176	
1700	176	Special Amateur, CW, ICW, Ph, Spk, exclus.
1500	200	
1500	200	Spec. amateur, and technical training schools, CW, exclusive.
1350	222	Aircraft, CW, ICW, Ph, non-exclusive.
1300	231	
1350	222	Class B broadcasting, Ph, exclusive.
1050	286	(See Note 1.)
1050	286	Reserved.
1040	288	
1040	288	Class A broadcasting, Ph, exclusive.
1000	300	(See Note 2.)
1000	300	Marine, CW, ICW, Spk, non-exclusive.
		(See Note 3.)
1000	300	Class A broadcasting, Ph, exclusive.
667	450	(See Note 2.)
667	450	Marine, CW, ICW, Spk, exclus. (See Note 4.)
667	450	Class A broadcasting, Ph, exclusive.
550	545	(See Note 2.)
550	545	Marine and aircraft, CW, ICW, Spk, exclus.
500	600	
500	600	Marine and aircraft, CW, ICW, exclusive.
		(See Note 3.)
500	600	Marine and aircraft, CW, ICW, Spk, exclus.
445	674	
445	674	Government, CW, non-exclusive.
445	674	Marine and aircraft, CW, ICW, Spk., exclus.
375	800	
375	800	Radio compass, CW, ICW, Spk, exclusive.
375	800	Marine, Ph, exclusive.
315	952	
315	952	Reserved.
315	952	Government, CW, ICW, Spk, exclusive.
300	1000	
300	1000	Radio beacons, CW, ICW, Spk, exclusive.
300	1000	Reserved.
285	1053	
285	1053	Marine, Ph, exclusive.
275	1091	
275	1091	Government, CW, ICW, non-exclusive.
275	1091	Marine, Ph, exclusive.
250	1200	
250	1200	Government, CW, ICW, non-exclusive.
250	1200	Marine, Ph, exclusive,
235	1277	
235	1277	University, college and experimental, CW, ICW, exclusive.
230	1304	
230	1304	Government, CW, ICW, Spk, exclusive.
190	1579	
190	1579	Marine and point-to-point, non-government, CW, ICW, Spk, exclusive.
120	2500	
95	3158	Government, CW, ICW, Spk, exclusive.

**Note 1**—Not more than six CW amateur stations to be licensed to use wave frequencies above 1050 kc/s (wave lengths below 286 meters), for communication across natural barriers.

**Note 2**—A class A broadcasting station is a station of sufficient power to serve an extensive territory. Fifty territorial wave frequencies approximately 10 kc/s apart are to be assigned by Department of Commerce to local areas throughout the United States without duplication. The ten such areas within each of five national zones are to have wave frequencies separated by approximately 50 kc/s.

**Note 3**—The 1000 and 500 kc/s (300 and 600 meter) waves are for calling and distress purposes, with a minimum of traffic.

**Note 4**—Mobile service on the 667 kc/s (450 meter) wave is to be stopped between 7 and 11 p. m., local standard time, and to be transferred in so far and as soon as practicable, to wave frequencies between 500 and 375 kc/s (wave lengths between 600 and 800 meters.)

## “Who’s Who” at the Second Radio Conference

A list of those attending the Second Radio Conference, Department of Commerce, Washington, D. C., March 20-24, 1923, follows:

- Edwin H. Armstrong, Columbia Univ., New York.
- Major Louis B. Bender, Signal Corps.
- Commander D. C. Bingham, Navy Department.
- Dr. Louis Cohen, War Department.
- C. B. Cooper, New York, N. Y., Natl. Radio Chamber of Com.
- Dr. Frank W. Elliott, Davenport, Ia., WOC Nat'l Broadcasters' League.
- Lloyd Espenschied, New York, N. Y., A. T. & T. Co.
- Harry B. Gauss, Chicago Daily News.
- Paul F. Godley, Cedar Grove, N. J., Adams, Morgan Co.
- Alfred N. Goldsmith, New York, N. Y., Inst. Radio Eng.
- A. H. Griswold, New York, N. Y., Amer. Tel. & Teleg. Co.
- John V. Hanlon, Pittsburgh, Pa., The Pittsburgh Press.
- L. A. Hazeltine, Stevens Institute of Technology.
- John V. L. Hogan, New York, N. Y., Engineer.
- Lt. W. S. Hogg, Jr., Navy Department.
- C. Francis Jenkins, Washington, D. C. (Pictures via Radio).
- John M. Joy, New York, N. Y., Motion Pictures Prod. & Distributors.
- Lambdin Kay, Atlanta, Ga., Atlanta Journal.
- Hiram Percy Maxim, Hartford, Conn., American Radio Relay League.
- Elam Miller, New York, N. Y., A. T. & T. Co.



(C. Fotograms, N. Y.)  
Joseph C. Smyth, 269 86th Street, Bay Ridge, Brooklyn, N. Y., who is the winner of the World's Championship for receiving code, taking 55 words a minute on straight code work.

- P. E. D. Nagle, Department of Commerce.
- E. E. Plummer, Chicago, Ill., Radio Digest Illustrated.
- George Schubel, New York, N. Y., Radio Broadcasting Soc. of America.
- H. R. Searing, New York, N. Y., Nat'l El. Assn.
- Eugene Sibley, Air Mail, Post Office Department.
- John W. Sutherin, Post Office Department.
- K. B. Warner, Hartford, Conn., Amer. Relay League.
- W. A. Wheeler, Department of Agriculture.
- Captain R. B. Woolverton, Signal Corps.
- C. A. Beasley, representing W. J. Baldwin, Birmingham, Ala.
- Carl H. Butman, Washington, Radio News Service.
- Dr. Louis Cohen, Signal Corps.
- J. C. Gilbert, Department of Agriculture.
- Louis Jay Heath, Treasury Dept.
- Raymond E. Huntington, Wellesley Hills, Mass.
- H. P. Perrill, Office Chief U. S. Coordinator.
- Harold J. Power, Medford Hillside, Mass., Amer. Radio Res. Corp.
- Mai. Gen. Geo. O. Squier, Chief Signal Officer, U. S. A.
- F. P. Guthrie, Shipping Board, Radio Section.
- Prof. C. M. Jansky, Univ. of Minnesota.
- Leo Fitzpatrick, Kansas City Star.
- D. B. Carson, Dept. of Commerce.
- W. D. Terrell, Chief Radio Inspector.
- J. H. Dellinger, Bureau of Standards, Washington, D. C.
- L. E. Whittemore, Bureau of Standards, Washington, D. C.

# Now is the Time to Build a Universal or All Wave Receiver

By Frederick J. Rumford, E.E., R.E.

It is probably only a question of time before most of the radiophone broadcasting stations will be sending on a much higher wave length than at present. When this happens, radio fans who have the present day equipment, which is only capable of receiving from 150 meters to 500 or 600 meters as its maximum wave length, will find it necessary to load their sets with those cumbersome loading coils, which are anything but efficient. Therefore, the desirability of having a set of the kind described herewith will be apparent.

This set is efficiency in every respect, is flexible and makes it possible to receive on wave lengths from 150 to 20,000 meters. It is easily operated and uses the efficient Armstrong regenerative hook-up. The controls are few and when it is desired to receive on a higher wave length, it is only necessary to withdraw the present coils and insert the desired coils in their respective plugs.

The hook-up used is a great DX getter and DX fans who spend the later hours of the night trying to tune in long-distance stations will find this set practical.

The set the writer built was designed so that it would function properly with one WD-11 dry cell tube.

This set was designed with the idea that the prospective builder might at a later date wish to install additional amplification. Therefore, the two additional binding posts marked O. P. were placed so that with two jumper wires the set could be easily connected with the amplifier. The tuning accomplished is by varying the relation of the coils and the condensers V and VI.

Referring to the illustrations herewith, Fig. 2 shows a front view of the panel with its correct dimensions and proper symbols. Fig. 1 shows the hook-up of this set. Here is a list of the necessary parts and their estimated costs:

1 Formica panel, 9x12x $\frac{1}{4}$ .....	\$3.24
1 Soft wood base, 12x9x $\frac{3}{8}$ .....	.50
8 Binding posts at .10 each.....	.80
1 Single circuit jack.....	.75
1 Plug.....	1.00
1 43 plate variable condenser.....	4.00
1 23 plate variable condenser.....	3.50
2 Three-inch dials at .50 each.....	1.00
1 Calibrated triple coil mounting.....	5.00
1 Vernier rheostat, 2 $\frac{1}{2}$ ohms resistance.....	1.50
1 Grid leak and condenser.....	1.00
1 35 turn honeycomb coil, mounted.....	1.50
1 50 turn honeycomb coil, mounted.....	2.00
1 75 turn honeycomb coil, mounted.....	2.50
1 WD-11 dry cell vacuum tube.....	6.50
1 Dry cell, 1.5 volts.....	.40
1 Pair 3000 ohm head phones.....	5.00
1 45 volt B battery.....	3.00
1 Complete set of antenna and ground parts....	4.00
1 Phone condenser (fixed).....	.25
1 Complete set of accessories, wire, screws, tubing.....	2.00
	<hr/>
	\$49.44

When using more than one tube an additional bat-

tery should be used for each additional tube used. The batteries should be wired in multiple.

In starting the construction of this set the builder should mark and drill all the holes that are necessary. When this has been done a good rubbing with No. 0 sandpaper and then a rubbing with a high grade linseed oil will produce an excellent finish. The base of soft wood should be given a couple of coats of a good insulating compound. After this has dried, mount the panel on one of the long sides of the base by means of several brass wood screws. Now mount the following parts upon the panel: triple coil mounting, condensers, dials, jack, rheostat and binding posts, and the little shelf at the back of the panel for the mounting of the WD-11 socket. This shelf is held in place by two brass wood or machine screws which are fastened from the front of the panel and hold the shelf rigid. The socket is then mounted upon the shelf. I advise using an adapter and the usual standard type socket as at a

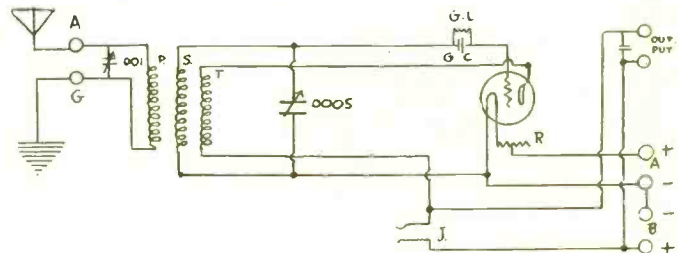


Fig. 1. Hook-up of Mr. Rumford's Universal All Wave Receiving Set.

later date, if the builder should desire to use a radiotron tube, he easily can do so by slipping the adapter out of the socket and inserting the radiotron tube in the socket. The only other change necessary will be to use a six volt storage battery for the heating of the filament.

The writer has tried another method of mounting this tube, that is the WD-11, and this method is to take the usual WD-11 socket and place up against the back of the panel and screw the brass wood screws in from the front of the panel into the socket proper which is a far better method than either of the above two.

If the builder wishes to save himself considerable work on the drilling of the panel, he can eliminate the ventilation holes on the panel proper, as the glow from the filament of the WD-11 tube when it is heated is barely visible.

The grid leak and grid condenser as well as the phone condenser can be mounted upon the base proper. The B battery can be mounted upon the base, which will help greatly to hold the set more firmly upon the operating table.

When he has the right idea from a study of the diagrams as to how the wiring ought to be done, the builder should connect a wire from the aerial binding post to one of the connections of the primary honeycomb coil, and another wire from the ground binding post to the remaining connections of the primary honeycomb coil. Now connect a wire from the aerial connections to the rotor of the 43 plate variable con-

(Continued on next page)

# Government Radio Messages Aggregate Millions

**D**URING the first quarter of the fiscal year 1923, the Naval Communications Service transmitted about 4,500,000 words, the Navy's part of which was 3,000,000, some of which necessarily was administrative, in connection with the Communications Service. It is surprising that the next largest user was the Department of Agriculture with nearly 500,000 words.

In the calendar year, the Navy handled a total of 15,768,308 words for the Government through its shore stations. Of this total, 10,884,217 were naval orders and despatches. The balance, nearly 5,000,000 words, was for other departments, both the Agricultural and War Department filing over 1,000,000 words each. All

told, 16 different bureaus used the Naval radio service, including the White House and the House of Representatives.

Based on commercial rates, the Communications Service for the year ending June 30, 1922, handled for the Navy \$2,721,000 worth of business and \$1,040,667 for other Government departments. The Navy receives no transfer of funds or re-imbursements for the work performed for other Government departments, yet the savings are actual. The Navy has these necessary facilities and offers them to other department's use for official business. During the fiscal year 1922, the commercial work handled amounted to \$277,122.42.

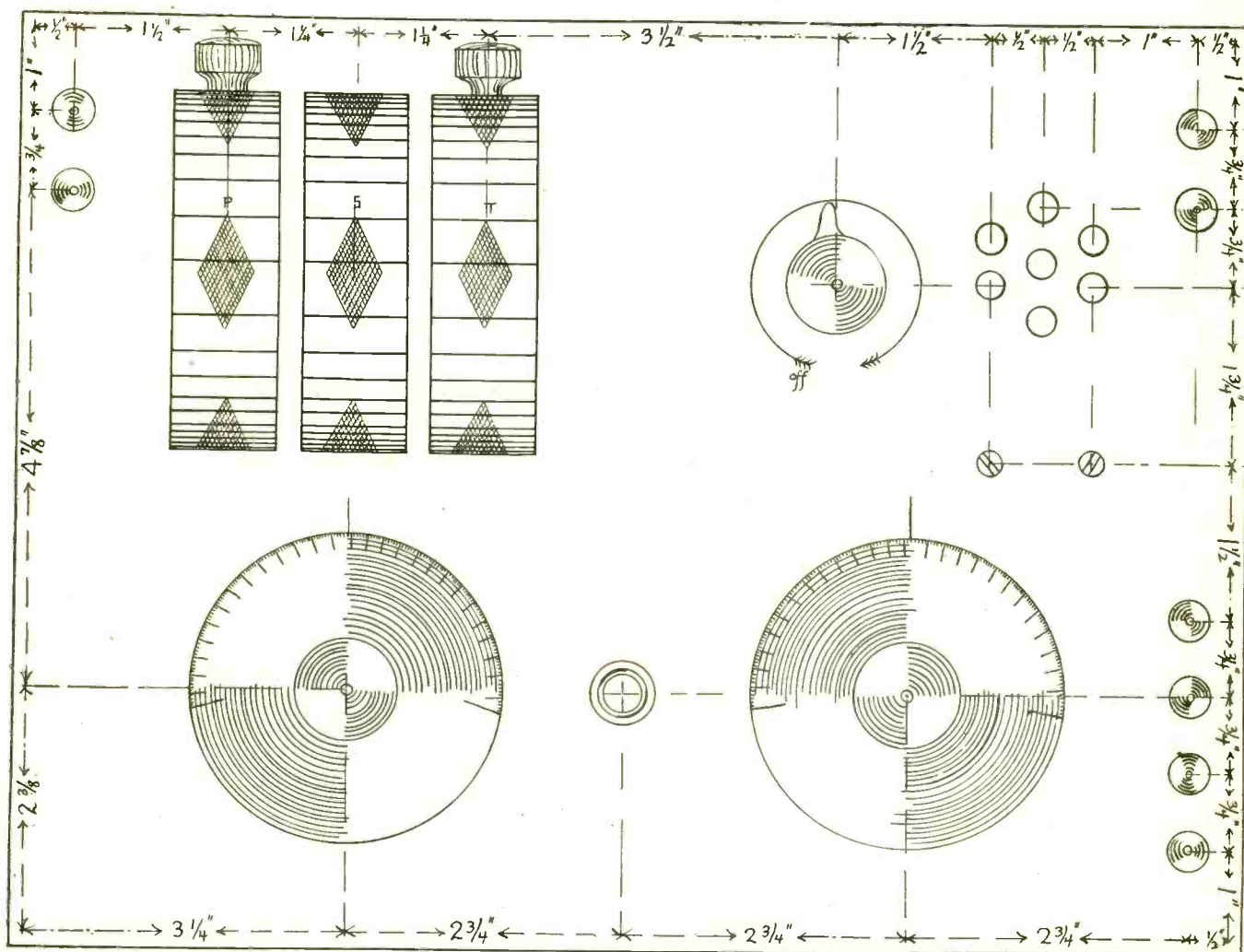


Fig. 2. Front view of panel, with correct dimensions and proper layout, used in building Mr. Rumford's Universal All Wave Receiver.

(Continued from preceding page)  
 denser, and still another wire from the ground connections to the remaining or stator connections of the 43 plate variable condenser. A wire is now run from one of the connections of the secondary honeycomb coil to one side of the grid leak and condenser, and from the remaining side to the grid post of the vacuum tube socket. The remaining side of the secondary honeycomb coil is connected with one side of the filament wire. The 23 plate variable condenser is shunted across the posts of the secondary honeycomb coil. Another wire connects with one side of the tickler honeycomb coil and connects with the plate post of the vacuum tube socket. The remaining side of the tickler honeycomb coil connects with the upper blade of the jack.

The lower blade of the jack connects direct with the positive of the B battery. A wire also connects with the upper blade of the jack and with the upper output binding post. The remaining binding post connects with the positive of the B battery. Across these two binding posts is shunted a fixed phone condenser. A wire also connects with the negative side of the A battery and with one post of the rheostat. The remaining post connects with the filament post of the vacuum tube socket. The positive post of the A battery connects direct with the remaining filament post on the vacuum tube socket. There is a short jumper wire connecting the positive of the A battery to the negative of the B battery. This wiring should be done with No. 14 bare copper wire, insulated with varnished tubing.





# Cable Superseded by Radio in Navy

By Carl H. Butman

**D**ESPATCHES for American naval vessels in the Near East are now being transmitted by radio from Annapolis and are being copied directly by vessels in the vicinity of Constantinople, with excellent results, according to Admiral Ziegemeier, director of Naval Communications.

Radio is becoming a very formidable competitor with cable service, and as far as the Navy is concerned, cables are almost obsolete. Messages are never routed by cable except to some South American countries, and if a man-of-war is there, they go by radio. Direct regular radio circuits are maintained between Washington and San Francisco and San Diego, and it is seldom that a single word is missed. Washington communicates directly with Puget Sound, and Puget Sound and San Francisco communicate every odd hour of the day.

On the Atlantic Coast, the Navy has seven main radio stations: Bar Harbor, Me.; Sayville, L. I.; Annapolis, Md.; Arlington, Va.; Cayey, P. R.; Guantanamo, Cuba and Panama, besides a large number of coastal radio stations. The station at Bar Harbor, Me., receives all official government messages from Europe, the Pacific and the fleet in the West Indies transmitting them to Washington over a leased wire. Since the fire at the Bar Harbor station, which destroyed some buildings and barracks there, the Navy has decided to turn this station into a coastal station and receive all trans-Atlantic and trans-continental traffic at Washington. Facilities in Washington for reception are being improved and it is contemplated that by the end of April, Bar Harbor will cease as the Navy's chief receiving station. This will save reconstruction of buildings there, eliminate the expense of the land line to Washington amounting to \$25,000 a year, and cut the Bar Harbor personnel from 56 to 15 men.

Sayville is used as a transmitting station to the fleet and as a "standby" for Annapolis, which is the principal Atlantic Coast transmitting station to Europe and to the Pacific. Both Annapolis and Sayville are con-

trolled from the Navy Building at Washington. Until recently the Government's method of communication with Admiral Bristol at Constantinople was from Annapolis to Paris via radio, over a leased land wire to Coblenz, Germany, thence to Vienna. From there, the message went by radio to a Naval vessel in the Mediterranean, which relayed it by radio to the Embassy at Constantinople.

Return messages were sent the same way except that the message originated on the station ship and, on this side, was received at Bar Harbor and telegraphed to the Navy Department. But during the last two months, messages have been copied direct from Annapolis by the Navy's station ship at Constantinople. Whether this can be done during the summer season remains to be seen.

## NINE BROADCASTERS LICENSED

**T**HE Department of Commerce licensed nine new broadcasters during the week ending March 24, one of which is a Class B Station located in Philadelphia. They are as follows:

Call	Station	Power
WDAH	Trinity Methodist Church, El Paso, Tex.	200 watts
KNX	Electric Lighting Supply Co., Los Angeles, Cal.	250 watts
KFFP	First Baptist Church, Moberly, Mo.	100 watts
KFEZ	American Society of Mech. Engrs., St. Louis, Mo.	500 watts
WRAL	Northern States Power Co., St. Croix Falls, Wis.	100 watts
KFHR	Star Electric & Radio Co., Seattle, Wash.	100 watts
WDAR	Lit Brothers, Philadelphia, Pa. (Class B, 400 meters)	500 watts
KFHH	McCue, Ambrose, Neah Bay, Wash.	50 watts
KFEY	Bunker Hill & Sullivan Mining & Const. Co., Kellogg, Idaho	10 watts

(Continued from preceding page)

This is not strictly true, for the circuits I have tested have given exceptional distance, even daylight range, for loop work. If you wish to increase your distance use two or three stages of radio frequency on the front end of a "Sooper," then reduce all B voltages as low as possible, for if you do not—it will paralyze. Too much noise for a "bottle" to handle—that's all.

Don't forget you must use tuned impedance or inductive hook-up on the last R. F. tube. (See diagram.)

When in doubt check your turns on loop and coils and go over your connections. When you have done your part the circuit will come in to more favor. These new tubes (U.V. 201A), (Cunningham 301A) amplifying tubes are very good (use 55-60 volts B+). You need not worry over critical filament adjustment, there is none. Just touch the filament rheostat—and hop to it. It takes time to balance up a line of tubes—three of them—but when they start working for you, you are amply repaid.

Don't fail to remember that noisy, roaring, ripping, mushy signals that increase as the tickler coupling is loosened (turned towards minimum) mean too much voltage in the B+ on the oscillator and rectifier tubes. More "C" battery (negative bias) weakens signals and

causes distortion of either signals, speech, or music. Every tube has certain internal characteristics and I

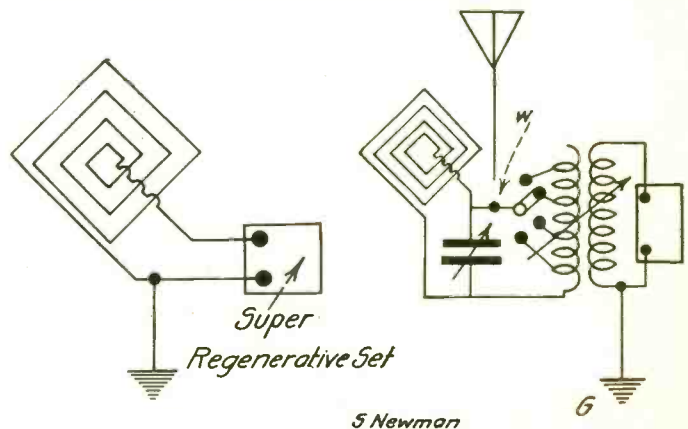


Fig. 4. If your tuning is too sharp and you want to broaden it, attach your ground as shown. If you want to add an aerial to your loop, try the method of hooking it on to W, and using a variocoupler as shown on the right.

have attempted to give you an average set of values that will work on most any old amplifier tube. You can refine and improve without limit.

# Sidelights From the Capital Radio Conference

By *Washington R. Service*

**W**ASHINGTON, D. C.—Members of the radio conference were entertained informally at dinner on Friday by Commissioner of Navigation D. B. Carson and other officials of the Radio Section. The big dining room of the Ebbitt was the scene of the first radio "get-together" in this country at which representatives of every phase of the art and industry were present. Work of re-distributing wave lengths was dropped for the moment, the business of the meeting being purely social.

\* \* \*

Secretary Hoover believes that the universal need for more broadcasting waves will be fulfilled by the conference report. As soon as the distribution is decided upon, he will ask the president to issue an executive order assigning some of the Government waves for public use.

\* \* \*

The plan of wave distribution presented by the radio inspectors to the radio conference was believed suitable for immediate application, whereas the compromise plan of the full committee cannot be put into operation for two or three months, it is understood, during which the already congested atmosphere may be precipitated any moment.

\* \* \*

According to Hiram Maxim, radio makes for peace and by developing international friendships through continued and instantaneous communication between different nations, may avoid misunderstandings and eliminate the need for wars.

\* \* \*

Composers and authors desire royalty for the use of their compositions when broadcast, Mr. Rosenthal told the conference, asking the Department of Commerce to prohibit the stations licensed from using copyrighted matter without payment of fees. But the Department replied that it might as well require licensed stations to pay rent and for the use of patented radio apparatus. Authors must go to court, it was decided.

\* \* \*

C. Francis Jenkins, the Washington inventor of radio

transmission of pictures, asked for a special transmitting wave, and predicted the practical distribution of still and moving pictures within a short time.

\* \* \*

Every time the transferring of the 300, 450 and 600 meter waves was mentioned, either Commander Bingham, of Naval Communications, or Mr. Guthrie, Radio Director of the Shipping Board, jumped up and protested. They strove, not unsuccessfully, to preserve these waves for ship communication. The suggestion that all spark sets be removed from ships was met with the statement from naval officials that an international question was involved and several years would be necessary for such a re-adjustment. One naval officer estimated that it would cost a million and a half dollars to replace sparks on naval vessels alone.

\* \* \*

The preservation of efficient wave lengths for use in the mobile services, such as ships and aircraft, was voiced at the conference by naval spokesmen. Fearing that the public was not included at the conference, one representative suggested the selection of a member of the radio receiving body, but Secretary Hoover said he was a fan and would protect the public interests.

\* \* \*

The S. S. "Leviathan" will have a 750 watt, duplex telephone set when she goes into commission, the radio confer-

ees were told by representatives of the manufacturers.

\* \* \*

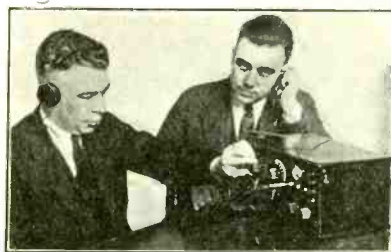
The Detroit "News" spends approximately \$100,000 annually in its radio activities, Mr. Campbell of that publication stated, explaining that "good will" was the only return.

\* \* \*

Leo Fitzpatrick, of the Kansas City "Star," official representative of the newspaper broadcasters, explained that his sheet gained only 173 subscribers due directly to radio broadcasting. But they have more than 35,000 fans who complain of the least change or delay in their schedules.



Singing into the new Thomas "glow" transmitter at Station KDKA. This transmitter has no diaphragm and is said to give perfect sound reproduction.



(C. Keystone View) Judge John Rounds, of the Conciliation Court at St. Paul, Minn., trying a case by radio. Judge Rounds is believed to be a pioneer in legal radio.



(C. Underwood and Underwood) Sir Basil Thomson, former director of the detective division at famous Scotland Yard, broadcasts a farewell to the United States from WJZ's Waldorf-Astoria studio, New York City.

# "Chief Justice" Hoover of Radio

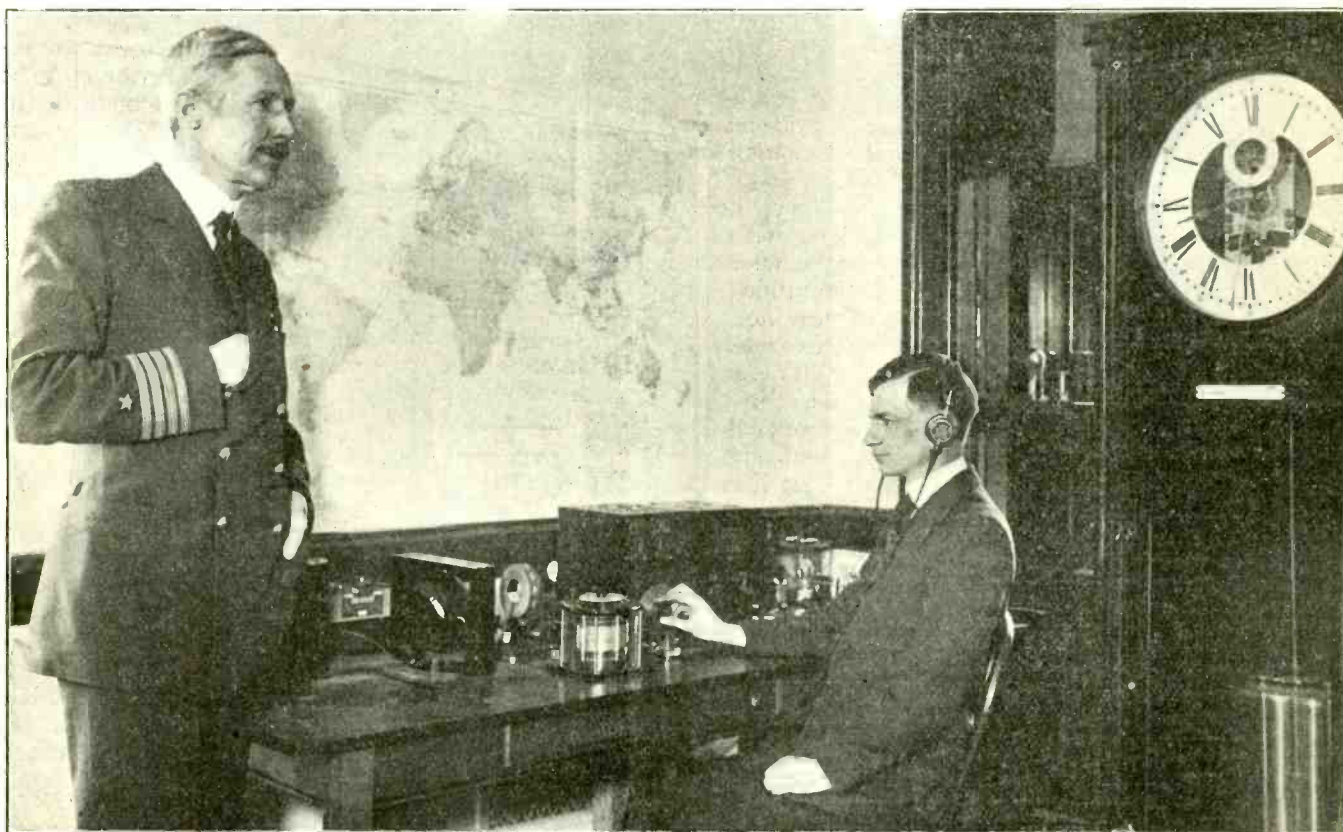
By Carl H. Butman

**F**OLLOWING in the lead of the great outdoor sport and the old favorite evening pastime, radio may take on an arbitrator. Just as Landis has come to have the "last word" in base-ball, and Hayes to write the "finale" of the movies, so Secretary Hoover may soon transmit "VA," the "30" of radio, putting an end to all arguments in the ether.

In calling the recent radio conference, Mr. Hoover offered not only to arbitrate radio disputes, but to make the necessary regulations which the Senate failed to provide. He has volunteered as a sort of foster father to this new art and industry, and hopes to clear up a threatening atmosphere. The conference in Washington, D. C., indicated whole-hearted, voluntary support by the several sections of the industry of an

straighten out difficulties and combat interference, he explained. Co-operation is assured through the fact that manufacturers, engineers, broadcasters, commercial interests and amateurs have voluntarily subscribed to a wave length distribution and agreed to abide by such regulations as Secretary Hoover lays down as necessary. This indicates, he pointed out, how close the great radio family can be brought together when necessary.

The inventor of "wired-wireless" emphasized the great benefit to radio of a period of unhampered development and operation under voluntarily accepted regulations, instead of hard and fast laws, which could only be remedied by the passage of other laws dependent upon the action of a rather dilatory Congress.



(C. Underwood and Underwood)

The Naval Observatory time signal office from which standard time is flashed daily to the country by telegraph and radio. Captain William D. McDougall, U. S. N., Superintendent of the U. S. Naval Observatory, is looking at the "original time."

administration by him. It only remains for the radio public to co-operate to offset a threatened slump and remove the present broadcasting interference. Incidentally, Secretary Hoover's administration in his present capacity would save the industry the cost of a privately paid arbitrator.

In the opinion of Major General George O. Squier, Chief Signal Officer of the Army, than whom radio has no more earnest supporter nor more generous technical contributor, the industry and public should co-operate with Hoover in his every wish.

"The failure of the Senate to pass the White Bill may be a blessing, although we all were disappointed at the time," General Squier said to the writer during the conference. The very lack of law requires a closer co-operation of the various radio activities in order to

Changes in regulations found necessary during a year of such operation could be applied immediately, without reference to Congress. "The art is advancing so rapidly that we hardly know what to expect next," General Squier said. "To-day radio is a service for the ear, but if the transmission of radio pictures—still and moving—is perfected, the eye may also be served.

"We must be ready to accept new views and apparatus at a moment's notice; not to do so would place this country in the rear instead of the van of radio progress." Since the White Bill was drafted, General Squier observed, many new phases had arisen which indicated that the bill was not entirely suitable.

"Secretary Hoover," the General said, "has practically volunteered to administer and arbitrate radio troubles for at least two years—free."

# The Radio Primer

*For Thousands of Beginners Who  
Are Coming Into Radio Circles*

Weekly A B C of Radio Facts and Principles Fully and Clearly Explained

*By Lynn Brooks*

**I**N diagrams, the potentiometer is shown hooked up in such a position that it is practically short circuiting the A battery. Is this not a constant drain on the battery?

The fact that the resistance of the potentiometers commonly used, is very high, and is overbalanced by the almost lack of resistance in the rest of the circuit, prevents all but a very small and negligible amount of current flowing through it, even when the rest of the circuit is turned off. In some hook-ups this is taken care of by an independent switch breaking the circuit before the current gets to the potentiometer.

*Why is it that when more than two steps of audio-frequency are used that the microphonic and outside noises overbalance the signals, and oftentimes make reception impossible?*

With audio-frequency amplification every noise heard in other circuits, will be amplified along with the transmitted sounds. Thus it is that a scratch which is hardly noticeable in the detector, will be amplification along with the signals and because of its low note be so troublesome when amplified that it will exclude the signals at the output of the third stage. The same applies to the inter-tube noises. It is thus seen that no more than two stages can be utilized without allowance being made for extraneous noises which cannot be filtered, and are sometimes very bothersome if more than two stages are used.

*Why is it that some stations will be received fine and then a sudden change will take place and they will be all squeals and howls?*

This can be caused in two ways. The first is by the interference of some nearby receiver oscillating and causing interference by re-radiating on the same wave, or it can also be caused by the carrier wave of another transmitting station suddenly interfering with that of the first, causing a beat note which will interfere.

*Can the interference of the nearby receiver be eliminated in any way?*

No, this cannot be eliminated as long as the oscillations from the nearby receiver, or receivers, are of sufficient power to be noticed. The person owning a sensitive receiver can often detune a fellow listener's set simply by swinging his dials and getting his receivers to squeal. This is a drawback that cannot be eliminated, and consequently has to be put up with. It is possible to heterodyne a nearby set through this re-radiation of oscillations from a receiver.

*In case the builder of a single circuit receiver desires to increase the wave length range of his receiver how may he accomplish it?*

The simplest manner of doing this is to incorporate a suitable mounting and a concentrated inductance in the form of a honeycomb coil of the desired range. This should be inserted in the circuit between the antenna and the apparatus.

*Will this method decrease the signal strength on the lower waves?*

As the honeycomb is not used when lower waves are to be received some method of shunting the coil should be utilized. This can be accomplished by inserting a single point switch in the circuit, which will short the coil when it is not in use.

*What is meant by "distributed capacity"?*

Distributed capacity is the capacity between adjacent turns of an inductance. Between one turn and the next, the two turns act as the plates of a condenser, with the insulation acting as the spacing or insulation of the condenser. The effect of this is to seriously broaden the wave length of the inductance, and makes close tuning hard.

*Name some of the methods of keeping the distributed capacity of an inductance at a minimum.*

Some of the methods of keeping the distributed capacity of an inductance at a minimum are: Do not shellac the winding; use back winding if possible, or use staggered windings, such as spider web or honeycomb. There is no way of diminishing the distributed capacity of a straight flat-wound inductance, but if a flat-wound inductance is used, and shellac is also used to hold the turns, the distributed capacity will overbalance and the wave length will be so broad that correct tuning will be almost impossible.

## Radiograms

The members of the House of Commons will not be subjected to the temptation of "listening in" to jazz music or other entertainment features on the wireless telephone, to the detriment of their attention to official business, it was announced by the Postmaster General in reply to a suggestion made by a member that receiving apparatus be installed in the House. To this suggestion Sir W. Joynson-Hicks, the Postmaster General, replied that he did not think it was his duty to provide "such a counter attraction" in the Chamber of the House.

Professor Albert Einstein, of Berlin, Germany, and "relativity" fame, has erupted again with a new theory which, however, will not achieve much publicity as he says it is unintelligible to laymen. In reply to a question by a daily newspaper correspondent, Prof. Einstein is quoted as saying: "I can tell you in one sentence what it is about. It concerns the connection or relation between electricity and gravitation. It is grounded on the theoretical speculations and discoveries of the English astronomer, Eddington. It is a purely mathematical theory and, therefore, cannot be explained to a layman."

The first intercollegiate debate held by radio between New York University and Trinity College of North Carolina was broadcast one evening last week from WOR, the radio station of Banberger & Co., Newark, N. J. Radio fans will decide who won by sending their votes to WOR. Several votes were received by telephone a few minutes after the last speaker had concluded his rebuttal.

For the second time within a week wireless telegraphy came into play when W. P. Johnson, fireman on the Fenwicks Island Shoal lightship, thirty miles southeast of Cape May, N. J., was attacked with what the captain of the lightship thought was appendicitis. The radio operator on the lightship sent out an SOS call, which was picked up by the radio station at Cape May and flashed to Captain R. C. Weightman of the coast guard cutter "Kickapoo." The message said: "Bring a physician to the lightship." Dr. V. M. d'Marcy, veteran of the World War, volunteered. The "Kickapoo" proceeded down the coast. Dr. d'Marcy was put aboard the lightship and found that the sailor's condition required an immediate operation to save his life. The "Kickapoo" then steamed under forced draft to the Delaware Breakwater, where Captain Lynch of the Lewes Coast Guard Station transferred the sick man to the hospital. Word was received at Cape May by radio that the operation was a success.

# Radio and the Woman

By Crystal D. Tector

**F**RIEND Husband the other day came home real early and when questioned by yours truly concerning the reason, said that he was going to try a new aerial and the Beverage System as he heard that a man in town had had such wonderful results. So he put on his working clothes (a pair of torn and disreputable overalls, sneakers and a cap that he wears when he "puts the car in order") and started in climbing around the roof. I was inside making his favorite layer cake and paid no attention, as he generally gets an idea once in a while and then you can't do anything with him until he is either tired out or so disgusted with it that he refuses to work on it any more. An hour passed and no sign of friend husband, outside of a lot of noise on the roof. Suddenly, a yell and I saw a bunch of shingles come sliding down to the yard with a bang. I rushed outside and found F. H. very scared hanging on by the edge of his trousers to the roof, upside down. Perfectly safe, but looking ridiculous. After getting a ladder, and sending for the town builder to put a new roof on, he vehemently swore that "The next time that I try to put an aerial on the roof, I am going to stay on the ground to do it. Imagine what Dr. — and his wife next door must have thought! I looked perfectly ridiculous." "That is all right," say I, "but I think that the Doctor must have been disappointed when you arrived safe and sound. Well, such is life—it's filled with disappointments."

\* \* \*

**F**RIEND HUSBAND'S boss gets a "soft spot" every once in a while, and sort of "weeps for the world" according to hubby, and then simply can't hear any sad story. Last week was one of his "conscience" periods, and he heard of a blind asylum which needed help. So he took Friend Husband into his plans and thought that besides giving money he would donate a talking machine for their entertainment. "Talking machine! Why don't you be up-to-date and get them a radio receiver? It will give them more fun and it doesn't need so much care," said my hubby. "By Jove, you're right! Go out and get them one right away, bring it back and we'll take it up. You know more about those things than I do, so draw a check and go ahead." Well, friend husband went out and bought a nice little loop set, batteries and all, and brought it in to let the boss see it. He said the boss decided that he would take that one home to play with and made him go and buy another for the donation. Well, it's the old story. You can remain immune just so long, but when you fall you fall hard and quick. That's just the way with radio fans—they don't realize what they are missing until the little innocuous bug bites them and then they're gone for good.

\* \* \*

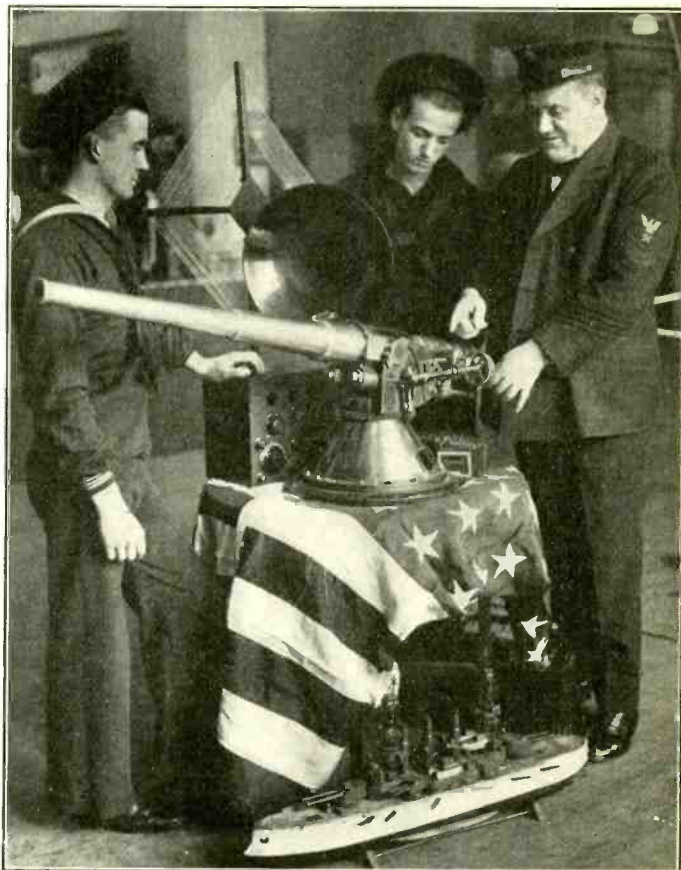
Girls, the editor asked me to publish a paragraph this week asking why some of the women don't write in for the DX Nite Owls. Surely some of us must be able to at least beat some of those "radio golf hounds." I know that my record is a mean one to look at, and I am going to put it in next week to start it along. Now who is going to follow me up?

\* \* \*

Some people are so impossible that it makes me believe that a babe in arms has more common sense than they have. The other evening the phone rang and my

husband's friend, who prides himself upon the fact that he is really handy and besides that calls himself an electrician, asked if he could bring his set over and show it to us, that something was wrong and all his bulbs had lit up bright and then gone out, and he couldn't light them up any more. When he came over he said that he had put in a new set of batteries and connected them up and then the bulbs had gone out. Well, he

## Radio Lecture Explained By Gun Model



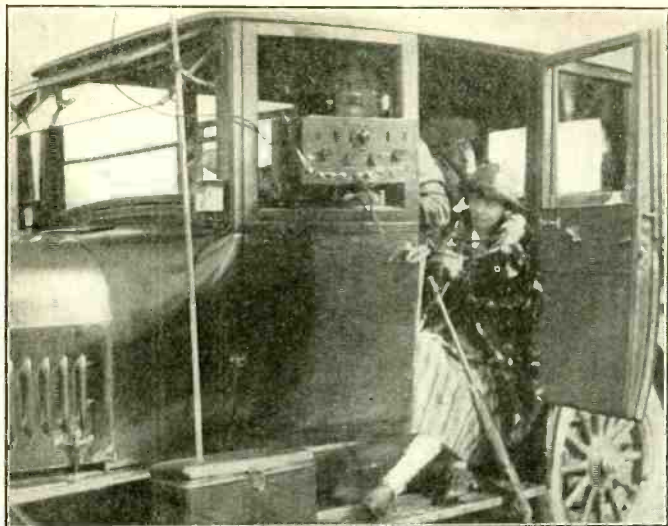
(C. Kadel and Herbert)

A lecture on gunnery is being broadcast. The lecture is received on a loop receiver, and by the use of a small model a demonstration is being given to future gun pointers. The illustration shows Chief Petty Officer A. L. Whalen explaining the lecture to R. P. Smith and M. O. Trunnel, assisted by the radio receiver in the background.

had connected the B batteries to the same posts as the storage battery, and consequently "blown" all his bulbs. Well, we could not make him understand why he shouldn't have done it, and his constant argument was, "Well, isn't it a battery, just the same? Why should I have to buy new bulbs just because I connected them wrong?" I wonder if his wife ever asks him to post a letter?

\* \* \*

Did you hear Romeo and Juliet broadcast last week? I was having the grandest time listening in to it, when F. H. woke up out of his after dinner snooze, looked at me a second, and then with a wry face, said: "Turn that Bla Bla off! It reminds me of the first time that I sat in the moonlight without my hat, and felt foolish." Well, I like that! He told me that I was the "one and only." Well, I've got him now, and that's all that counts.



(C. Kadel and Herbert)  
The way they relieve the "waits" between trap shooting tournaments at Rye, N. Y. Paul Von Boeckman, Mrs. B. Peel and A. F. Stillson using a loop receiver to enjoy the broadcasting during a lull in the activities.

# Lens and Plate Record Player The Latest In

Captions by Robert



(C. Photonews, N. Y.)  
Interior of the "radio shack" of the S. S. "Rochambeau." The set is a five tube receiver, employing the heterodyne principle, with three stages of amplification and a wave range up to 24,000 meters.



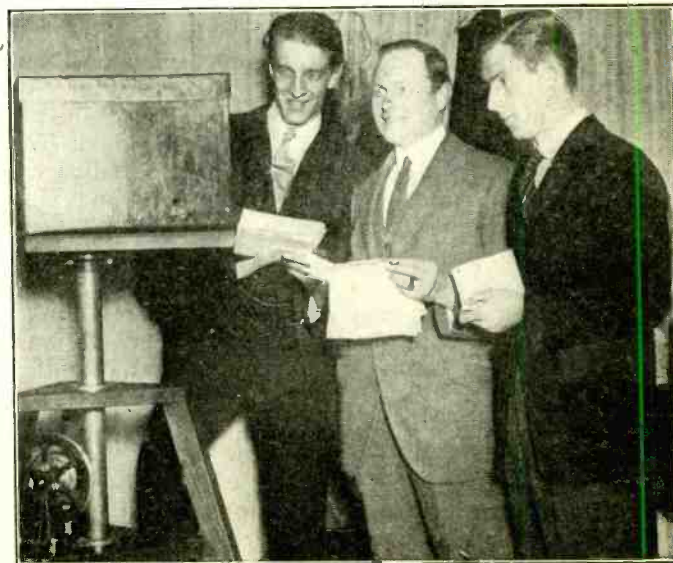
(C. Underwood and Underwood)  
Judge Ben Lindsay, noted jurist, who knows "every bad boy" in Denver, enjoying a few minutes rest listening in on his Westinghouse R. C. receiver. Judge Lindsay is a great believer in the efficacy of radio as a corrective for "bad boys."



(C. Wide World Photos)  
Elsie Janis, well-known comedienne, listening to an organ recital in New York while in Paris.



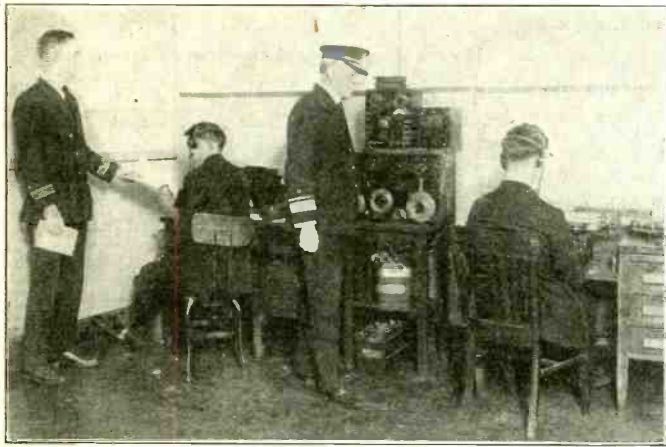
(C. Underwood and Underwood)  
Rt. Rev. Herbert Shipman, Bishop of the Episcopal Diocese of New York, broadcasting a pre-Easter address direct from the stage of the Palace Theatre, New York.



(C. Underwood and Underwood)  
A group of well known English broadcasters entertaining the children. The large transmitter used is quite unlike our small compact ones.

# Victoriously for Our Readers Radio Events

ert L. Dougherty



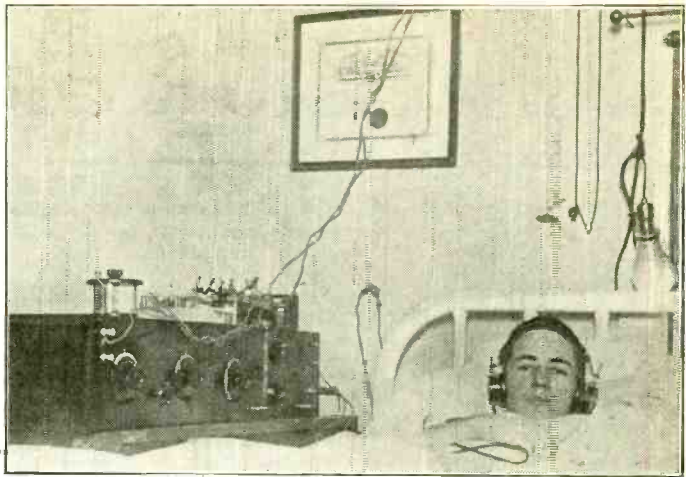
(C. P. and A. Photos)  
Admiral Ziegermeier, Chief of the Bureau of Naval Communications, inspecting the new receiving station of the department that will handle transatlantic communications.



(C. International Newsreel Photo)  
London butchers have gone us one better by installing receiving sets in their stores to attract customers and keep their minds off the butcher's hand while weighing the lamb.



(C. Photonews, N. Y.)  
Hope Hampton, noted screen actress, has been bitten by the radio bug, and has even made her own receiver. Miss Hampton is shown soldering tops, which is harder than "Exit languidly. Shoot!"



(C. P. and A. Photos)  
Lester Picker, of the San Diego, Cal., High School, has the distinction of being the first student in the country to be graduated by radio. He is shown listening in to the graduation exercises which were broadcast.



(C. International Newsreel)  
King Emmanuel, of Italy, listening in on some special tests arranged by the Italian Army to determine the advisability of broadcasting army orders and information.



(C. Keystone View Co.)  
Theodore Roosevelt's kiddies listening in on their De Forest loop set. Teddy, Jr., acted as operator while the photographer snapped them. Col. Roosevelt is an ardent fan himself, as are most men of affairs these "radiotic" days.

# Answers to Readers

**E**NCLOSED find a diagram showing my present set, which is a regenerative with two steps of amplification. Kindly publish or refer me to where I can obtain a hook-up of a step of radio frequency to go before the detector.—B. L. Bailie, 7720 Plymouth Road, Detroit, Mich.

We refer you to RADIO WORLD for February 24, 1923, where you will find the diagram you require, in answer to a similar inquiry by Mr. Beckhouse. You state that you have two stages of audio frequency, while the diagram has only one. This is of little consequence, as you will not have to change your present amplifier unit hook-up at all, it only being necessary to change the circuit in front of the detector, which is simple.

\* \* \*

1. Does it matter if the antenna is allowed to sag in the center? Would the signals be any stronger if the wire were stretched tight?

2. My antenna runs through the branches of trees. Would this cause the signals to fade out? The batteries are all new, and the set is a Westinghouse Type RC.

3. Is it necessary to have the lead in end of the antenna lower than the other end of the antenna, or should they be the same height?—Chas. E. Stevens, M. D., Bessemer, Michigan.

1. It will not affect the strength of the signals if the wire is sagged.

2. We cannot understand how the antenna running through the branches of the trees would cause the signals to fade, but advise you, however, to place your antenna where it will not have to run in this fashion, as experiments have proved that trees have the power to absorb energy and will therefore tend to decrease that received signal strength. Examine your ground connection and see that your antenna is well insulated. The fading might possibly be from the antenna swinging against the tree and then swinging back again.

3. It is not necessary to have the lead in end of the antenna lower than the other end. They may both be the same height.

\* \* \*

1. What size wire and how many turns should be used on the coils described by F. J. Rumford in his article on the Satterlee circuit?

2. What condensers should be used in the antenna and secondary circuits?

3. Do two separate wires run from the antenna binding posts to each of the coils separately, then through the coils and finally from the end of the coils to the ground post; or are the coils connected in series to the ground?—George J. Schretter, 200 Tyson Street, New Brighton, Staten Island, N. Y.

1. These coils are wound pancake form, and consist of 100 turns each for the outside coils. They should be wound with about No. 22 DC wire.

2. The condensers used are .0005 in the primary and .001 in the secondary circuit.

3. These coils are connected in such a manner that they are in parallel, which is exactly as the diagram has them. The selectivity of this set is due to this. Also, there is no antenna needed when a ground is used, or vice versa. If you use an antenna you do not need a ground, and if you use a ground you will not need an antenna. In nearby reception over a distance of 25-40

miles no antenna or ground is necessary, the set itself being all that is required for good reception.

\* \* \*

1. Is the WD-11 tube of any use for radio frequency?

2. In the circuit described by Mr. P. F. Albright, what principle is used? The circuit doesn't appear to be regenerative although the results seem to show that he is getting regeneration.

3. What is the Ultra Audion circuit or receiver?

4. Would anything be gained by using a tube detector instead of the crystal in the three tube reflex circuit published on March 3 by W. S. Thompson?

5. How many stages of radio frequency would be necessary to secure the same audibility that I now get through regeneration?

6. Using a fixed inductance of about 70 turns, on a 2½-inch tube, what should be the wave length range using a .0005 variable condenser, also using a .001 condenser?

7. How is the tuning governed in the set asked about in Question 2?—A. Leslie, Twin Falls, Idaho, P. O. Box 1056.

1. While the WD-11 tube can be used for radio frequency, it is not advisable because of the fact that not sufficient volume will be noticed in the strength of the signals. These tubes were not made for radio frequency, and should not be used for it. They will work, but not satisfactorily.

2. Regeneration is the principle, getting back-coupling from the plate much the same as in all the single circuit regenerative circuits.

3. The Ultra Audion method of reception, was discovered by Dr. Lee de Forest, and embodies the principle of directly coupling one side of the secondary circuit to the plate.

4. In the circuit you mention, you would of course gain some volume of sound but this would be discounted by the distortion which would be noticed. Crystal detection is ideal, and should be used in reflex circuits whenever possible.

5. This is a blind question and cannot very well be answered, as the amount of volume varies with different constants such as kind of tube, transformer, etc. But you will be disappointed if you do not at least use two stages, as with one stage no appreciable difference in distance or clearness can be noticed.

6. The wave length range of this coil when used in parallel with the .0005 condenser will be approximately 300-750 meters and with the .001 condenser it will be about 300-1400 meters. This is of course an approximate calculation, and does not take into consideration the actual length of the antenna used.

7. The tuning is accomplished by means of the rotor of the double wound coupler, the construction of which is shown in the sketch.

\* \* \*

1. Compared with the WD-11 tubes, how are the "Midget Peanut" 3 volt tubes?

2. Can these tubes be used with Ortherus Gordon hook-up?

3. Will these tubes stand 45 volts on the plate?—Edgar L. Miller, 2353 Payne Street, Louisville, Ky.

1. We do not compare various makes of competitive apparatus in this column; so we cannot, therefore give you the information that you desire on this point.

2-3. These tubes can be used in the Gordon circuit and they will stand the voltage you name, although it is not necessary to use 45 volts on the plate to get them to work their best. Harm is done by using more plate voltage than is necessary and by burning the filament high, than any other method of disuse. The wise user will operate his tubes on as low plate and filament voltage as he can efficiently.

\* \* \*

Where can I obtain blueprints of circuits described in your issues by W. S. Thompson and Frederick J. Rumford?—K. H. Pettit, care Choctaw Telephone Co., Soper, Okla.

We do not handle blueprints of these circuits, but if you will communicate with the writers you mention, through RADIO WORLD, we will see that the letters are forwarded.

\* \* \*

Give me a hook-up for the following apparatus: 23-plate condenser, variometer, loading coil, switch, tube, etc.—Joseph Honnors, 134 Wheeler street, Gloucester, Mass.

We refer you to RADIO WORLD for February 17, 1923, where you will find a circuit such as you desire on page 11 under the heading "A Hook-Up That Is a Wonder," by George W. May.

\* \* \*

Where can I obtain information on the reflex circuit published in RADIO WORLD for February 17, 1923, by C. White?—K. L. Hathaway, 3157 Maple street, San Diego, Cal.

If you will address a letter to the writer of the article in care of RADIO WORLD we will see that it is forwarded to him.

## Assistant Examiners Wanted for the Patent Office

THE United States Civil Service Commission announces that an open competitive examination will be held throughout the country on May 9, 10, and 11. It is to fill vacancies in the Patent Office at Washington, D. C., at an entrance salary of \$1,500 a year, plus the increase of \$20 a month granted by Congress. There is provision for promotion to positions paying as high as \$3,900 a year. In addition to present vacancies, 43 new positions are authorized, effective July 1.

Competitors will be examined in the subjects of physics, mechanical drawing, technicals, mathematics, language (French and German), and optional subject. Applicants must select one of the following optional subjects: Electro-chemistry, general chemistry, or chemical, civil, electrical and mechanical engineering.

On account of the urgent need for assistant examiners, the examination papers will be rated and certification of eligibles made within the shortest possible time after holding the examination.

Full information and application blanks may be obtained from the United States Civil Service Commission, Washington, D. C., or the secretary of the Board of U. S. civil service examiners at the post office or custom house in any city.

## Business Will Continue to Be Good

THE recovery of business from the depression of 1921 has proceeded normally, in spite of the European unsettlement, and good business may be expected throughout 1923, according to a report made public by the Harvard Economic Service, at Cambridge, Mass., last week. The outlook for the rest of this year is further expansion of business, firm or higher commodity prices, and firm or higher money rates.



# United States Stations Heard in Cuba

Frank H. Jones, a radio enthusiast of Tuinucu, Cuba, is well-known in the radio world for this enthusiast has brought in nearly every broadcasting station in the United States. Each night he listens-in regularly to such stations as KDKA, the Westinghouse station at East Pittsburgh, WJZ, the Westinghouse-Radio Corporation station at Newark, N. J., Davenport, Iowa, Chicago, or any of the so-called big stations.

Recently Mr. Jones wrote to the Westinghouse Electric International Company's Cuban office in Havana telling how he obtains such good radio records.

His letter is so interesting that excerpts from it will be worth while reading for any amateur:

"With the R. C. set (the Westinghouse single circuit tuner with two stages), on the detector tube alone I have heard over

100 United States, Cuban and Porto Rican radio telephone stations. My radio golf score now stands at over 100,000 miles. Ordinarily I use an antenna with the R. C. set although with a four foot loop, not shown in the photograph, connected with one side to the antenna post of the R. C. set and the other end free and using a ground, I have heard KDKA, WGY, and other stations with the detector tube alone.

"The set underneath the R. C. I made myself. The four dials at the left are various condensers and tapped inductance. Knobs in center are attached to three radio frequency amplifier 201 tubes and two potentiometers. Towards the right is a complete three circuit regenerative tuner with variocouplers, grid variometer and plate variometer; then the detector tube and its rheostat and phone jack.

"In this set I can use (by throwing various switches inside the cover of the set) the following:

"(1) Antenna with three stages radio frequency amplification and detector.

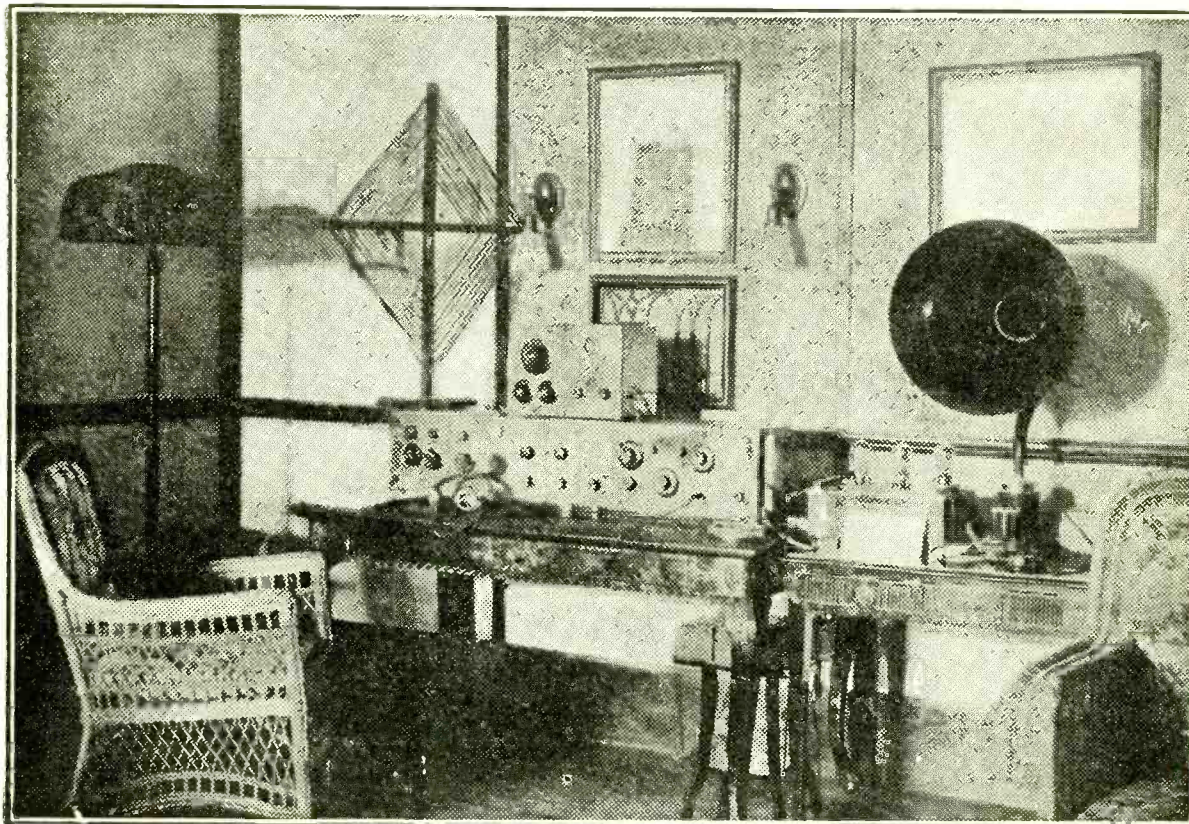
"(2) Antenna with triple coil honeycombs inside set with three stages radio frequency amplification and detector.

"(3) Antenna and three circuit regenerative receiver and detector.

"(4) Antenna and three stages of radio frequency amplification and regenerative circuit combined.

"(5) Eighteen inch loop shown on top of set with three stages of radio frequency amplification and detector.

"Inside the set is an audio frequency transformer for coupling the detector tube to the magnavox amplifier."



Frank H. Jones' radio receiving station at Tuinucu Cuba, which regularly picks up United States broadcasters.

## Radio Club of Brooklyn, N. Y.

**T**HE Radio Club of Brooklyn, N. Y., the oldest and foremost radio club in that city, is now well in its eighth year of progress. It is the representative radio club of Brooklyn, and an important factor in Brooklyn's amateur radio. It numbers among its membership many famous in radio engineering and amateur DX.

At its last meeting plans were presented for the club's annual affair. It promises to be a merry occasion, and a good time is assured all who attend. Further announcements regarding this will be made later.

All complaints of amateur interference should be addressed to this club, since it has been authorized by the Executive Radio Council to take care of such affairs. These complaints should comprise Brooklyn only. Matters in other cities should be addressed to the local clubs.

Meetings are held the second and fourth Fridays of the month at 2211 Bedford avenue, near Church avenue, at 8:30 p. m. A

cordial invitation is extended those interested in amateur radio to visit the club. Communications should be addressed to the secretary, D. F. Kirchick, 409 Osborne street, Brooklyn, N. Y.

## Beware Buying This Stolen Radio Apparatus!

**T**HE Edward J. Goetz Co., 47 Cambridge Building, Cincinnati, Ohio, requests RADIO WORLD to notify the industry that the company's warehouse, at 2409 Harris avenue, Norwood, Ohio, was burglarized recently, and the following merchandise stolen: One F. R. L. super set, one Fifth Vocatone, one Edgco de luxe set, one Magnavox, two Bristol loud-speakers, and a considerable number of small radio parts.

Dealers are requested to be on guard, and if any of the merchandise mentioned is offered to them to notify their local police authorities, as well as the owner of the goods.

## WGY Spells Schenectady, N. Y.

**C**ORRESPONDENTS of WGY, the General Electric Company's radio broadcasting station at Schenectady, N. Y., frequently have trouble in spelling the name of the city. English radio fans generally address "General Electric Company, New York," and make no attempt to spell "Schenectady." A five-year-old boy living at North Hoosick, Mass., has happily solved the problem according to the following which appeared in a Massachusetts newspaper:

"Fred Stevens, of North Hoosick, picked up the five-year-old son of Ira Fisk, and gave the boy a lift on the way to school. The juvenile Fisk is noted for his brightness and Mr. Stevens began a quiz. The youngster, of course, spelled 'cat' and things of that kind without any trouble, but Mr. Stevens thought he put a poser when he asked the boy if he could spell 'Schenectady.' 'Sure,' was the prompt response. 'WGY.'"

# Latest Radio Patents

## Radio Transmission Control System

No. 1,447,773: Patented March 6, 1923. Patentees: Lloyd Espenschied, Queens, N. Y., and Ralph Bown, East Orange, N. J.

This invention relates to radio signaling, and more particularly to the control of the level of transmission in such signaling. While it will be described as applied especially to radio telephony for the reason

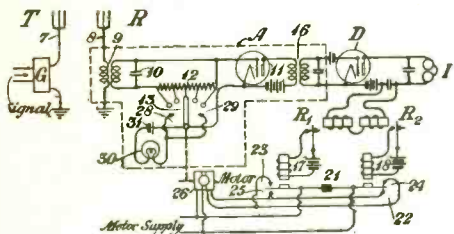


Diagram of Espenschied and Bown's Radio Transmission Control System.

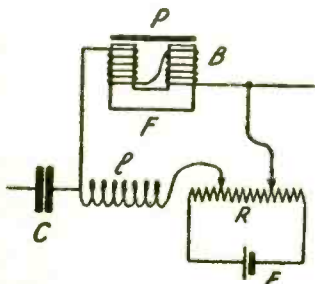
that the need is greatest in that field, it is to be understood that it may be applied equally well to telegraphy, or the transmission of any other signals. Its object is particularly to improve the constancy of transmission characteristics in radio communication.

## Radio Receiving System

No. 1,447,793: Patented March 6, 1923. Patentee: Marius Latour, Paris, France

The present invention relates to improvements in circuit arrangements of radiotelegraphic receiving stations for the purpose of increasing the sensitiveness of the receiving and making possible the application of the principle of heterodyne action in the reception of Hertzian waves.

As well known, in the case of crystal detectors, the rectified portion of the current is proportional to the square of the alternating potential  $v$  acting on the circuit comprising the detector. On the other hand, if a potential  $V$  of a slightly different period is introduced into the receiving circuit it is found that the sensitiveness of the receiving increased with the potential  $V$  up to a certain limit.



Latour's Improved Radio Receiving System.

It has been found advisable to increase  $V$  until the law of the square no longer holds good and up to a point beginning at which the rectified portion of the current is simply proportional to the potential applied to the detector. The increasing of  $V$  above this value will be useless.

The only difficulty that will be encountered in increasing  $V$  will be the presence of a permanent rectified current in the telephone. This permanent current will cause the per-

manent attraction of the diaphragm that may cause a lowering of the sensitiveness of the telephone. As a result of this, beginning with a certain value for  $V$ , the increase in sensitiveness corresponding to the increase of  $V$  will be concealed. This disadvantage may be remedied in the following simple manner: A simple expedient is to use telephones provided with magnets of lower magnetization. The permanent rectified current would only add its effect to the magnetism of the magnet to supplement its insufficiency and produce the necessary permanent induction under the diaphragm. It is also conceivable that we may operate without a permanent magnet and use only the rectified current for producing the necessary permanent induction.

In radio signaling there are present to an enormous extent variations in the transmission characteristics which render it difficult to obtain satisfactory signal conditions and which result, among other things, in large fluctuations in the volume of a telephone or other message being transmitted. These variations may be due to such well known phenomena as "fading away" or to differences in day and night signaling. Or, again, they may be due to changes in the apparatus, either at the sending or receiving stations. If, in long-distance radio transmission, repeater stations are used further possibilities for variations enter. These variations may be sudden or slow, depending on their origin, but in any case detract materially from the effectiveness of radio communication.

manent attraction of the diaphragm that may cause a lowering of the sensitiveness of the telephone. As a result of this, beginning with a certain value for  $V$ , the increase in sensitiveness corresponding to the increase of  $V$  will be concealed.

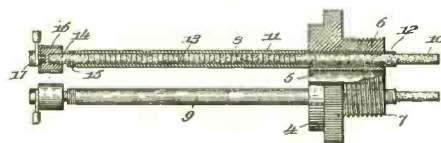
This disadvantage may be remedied in the following simple manner:

A simple expedient is to use telephones provided with magnets of lower magnetization. The permanent rectified current would only add its effect to the magnetism of the magnet to supplement its insufficiency and produce the necessary permanent induction under the diaphragm. It is also conceivable that we may operate without a permanent magnet and use only the rectified current for producing the necessary permanent induction.

## Flexible Electrode

No. 1,447,357: Patented March 6, 1923. Patentee: David R. Price, Newtonville, Mass.

This invention relates to an improved non-corrosive and flexible electrode. While adapted for general use wherever



Sectional View of Price's Flexible Electrode.

electrodes of such characteristics may be desirable, it is of particular application in connection with the device for determining the liquid level in storage batteries which I have described and claimed in application Serial No. 358,495, filed on even date herewith. In the construction of an electrode for use in connection with storage batteries or the like, the electrode must be constructed of material inert in sulphuric acid or in similar electrolytes. Storage batteries give off fumes from the electrolyte, especially

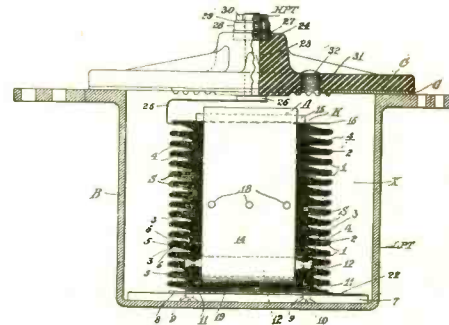
during the charging of the battery, which fumes are highly corrosive in action so that it is essential that the connection of the usual metallic conductor to the electrode take place at a point relatively remote from the point of discharge of the fumes. In order to carry out this last requirement it is highly desirable that the electrode itself be flexible since storage batteries are very generally located in restricted spaces. A solid electrode extending away from the battery proper would be easily broken and therefore unreliable.

It is an object of my invention to provide a flexible electrode formed of material which is normally inert in sulphuric acid or similar electrolytes and to provide such an electrode which may be easily and cheaply constructed of material which may be readily obtained. It is also an object of the present invention to provide a new and improved method of forming and assembling such electrodes.

## Electrical Condenser

No. 1,446,650: Patented Feb. 27, 1923. Patentee: Byron Macpherson, Roxbury, Mass.

THIS invention relates to improvements in electrical condensers of the plate or sheet type, especially of the type wherein the condenser is divided into sections and the sections connected in series for high potential service, although not limited to series condensers; and the invention consists of certain improvements in the means for clamping the stack. This application is a continuation in part of my application Serial No. 301,498, filed June 3, 1919.



Sectional View of Macpherson's Electrical Condenser.

My invention is especially applicable to the type of stack in which the two ends are at a difference of potential and is embodied preferably as an insulating clamp; that is, a clamp in which the two ends of the stack are connected by a member comprising insulating material. An advantage of my form of clamp resides in the fact that the capacity of the condenser remains constant with time and use.

This clamp in particular comprises metallic end blocks or members engaging the ends of the stack, and a flexible band of insulating material connecting the members and drawing the same into clamping relation against the ends of the stack, the ends of the stack being at high potential differences.

## Improved Dial Knob

No. 1,445,812: Patented Feb. 20, 1923. Patentee: Charles P. Whitall, Longmeadow, Mass.

THIS invention relates to dial knobs such as are used for adjusting various rotatable parts of radio apparatus. The invention has for its object to provide an improved molded dial knob of light but rugged construction and of distinctive and pleasing appearance and one which is particularly well adapted for economical quantity production. The invention consists in the novel and advantageous features employed.

# The DX Nite Owls

**T**HE Editor of RADIO WORLD will be pleased to receive sketches of hook-ups drawn carefully in black ink or heavy pencil from the "DX Nite Owls" who send in records with a view to publishing them.

Send hook-ups of your sets, provided they contain something unusual. Send, also, the names of the various makes of apparatus you are using.

Make your letters brief and informative. Write on one side of the paper only.

The letters and hook-ups will be published in the earliest possible numbers of RADIO WORLD.

## Fine Stuff! Send 'Em in Men, Send 'Em in!

From Maxwell Davidson, Jr., Lawrence, L. I.

**B**EING a constant reader of RADIO WORLD and buying it weekly, I have noticed the column devoted to the DX'ers. I have not noticed many amateurs listed, however. I am sending my list for the period of time I have had my Grebe CR-9 (four months), and, if it is not imposing, I would like particularly to see my list published. I find a 43-plate variable condenser in series with my ground aids selectivity.

Local and DX—WJZ, WOR, WBS, WBAN, WAAM, WIP, WOO, WFI, KDKA, WEA, WHAS, WSB, WHN, WGI, WGF, WGL, WGM, WGY, WOC, KYW, WHAZ, WBZ, WHK, PWX, WWJ, WHB, WDA, WPI, WMAF, NOF, NAA, NAH, CFCA, WLW, KSO, WBAP, WPA (Texas), WBT, WCAU, KOP, WQAA, WIAO, WLK, WNAC, WWL (Louisiana), WDAJ, WLAG, WRW, WOH, WHAM, WCAE, WUP, WJAX, WEAO, WMAK, WDAF, WSY, WMAQ, WQAO, WMC, WIAR, WOAX, WDAL (Florida), WWAD, CFCA, CHYC, CKAC, WAAP (Kansas).

AM—IXB, 2AYZ, 2BUM, 2EL, 2PB, 2CLO, 2BQU, 2BY, 2AZY, 2ZL, 2BDF, 2BWU, 2ACY, 2OE, 2AFM, 2BUA, 2ABA, 2ACB, 2CPD, 1BKA, 1RI, 1BEF, 2ABD, 2AWL, 2CPW.

Grand total, 93. Can prove all with data and date. Would like to communicate with any Grebe 9 owner.

\* \* \*

## "Out Where the West Is"

From Pat Ewing, Hardin, Montana.

**I** AM a subscriber to RADIO WORLD and enjoy the DX Nite Owls very much. Here are some of the stations I get on a detector tube: Atlanta, Havana, New York, Chicago, San Francisco and Canada. We all get 1,500 miles or better out here (where the West is) every night. Any fan that does not have a loud-speaker might try this one: Put phones in coffee cups and note the results. I have a house full of music every night with detector tube, 2,000-ohm, head set and coffee cups. Try it.

\* \* \*

## Gotta Show Us Y'Know!

From H. R. Graf, Jackson, Mich.

**A**S a reader of the RADIO WORLD and especially interested in the "DX Nite Owls" records, I am sending my record of 24 stations in one evening from 7:00 to 9:00 o'clock P. M.

They are as follows: St. Louis, KSD; Chicago, KYW; Detroit, WWJ; Schenectady, WGY; Pittsburgh, KDKA; Kansas City, WHB; Newark, WJZ; Memphis, WMC; Davenport, WOC; Louisville, WHAS; Paducah, WIAP; Birmingham, WSY; Detroit, WCX; Fort Worth,

WBAP; Pittsburgh, WCAE; Winnipeg, Ont., CJCG; College Park, WDAJ; New York, WEA; Minneapolis, WLAG; Lockport, WMAK; Chicago, WMAQ; Boston, WNAC; Jefferson City, WOS; Atlanta, WSB. In all I have heard 75 stations. The farthest is Honolulu, Hawaii, KDYX, about 4,800 miles. I am using a tickler circuit and one-stage of audio-frequency, which I constructed.

\* \* \*

## Auburn Come in QSA

From Ora Lyons, 803 Main St., Auburn, Ind.

**I** READ in a recent issue of RADIO WORLD an article relative to the distance of a single-circuit detector tube set. I am using the above circuit and receive the Los Angeles, Cal., station, KHJ; Winnipeg, Canada, CJG; Dallas, Texas, WFAA; Fort Worth, Texas, WBAP; Newark, N. J., WOR; Atlanta, Ga., WGM; Havana, Cuba, PWX, as well as several intermediate stations. Mr. Guy Fitzsimmons constructed the hook-up which I used in tuning in for the above named stations. Mr. Fitzsimmons lives in Auburn, Ind. My aerial is 18 feet high and 50 feet long.

\* \* \*

## California Registers WOW!!

From Earl Kauffman, Clovis, Calif.

**I** NOTE with amusement the challenges of Mr. Lindstrom, of Baraboo, Wis., regarding his hearing voice and music from all over the United States. Why shouldn't he? He is in an ideal location, and time is in his favor. If Mike Podhorn (old tin-horn), of Wood River, Ill., isn't getting like results from his ideal location would advise him to discard his expensive set and make himself a good one.

Time is against us for receiving eastern stations. However, we hear WLW, WGM, KDYL, KZN, WDAF, WOZ, WOA, WCAT, KSD and PWZ Wednesday and Saturday nights from 6 to 7:30 p. m., Pacific Time. This on one-step audio-frequency. Also want it understood there is nothing to patent about this set, but it has a vernier condenser, without which no one can expect to tune in anything and know what he is going to tune in. Use a spider-web coil for a secondary in a Remler style, tapped vario-coupler. Two sets of head phones are used, and can substantiate every station named by reliable witnesses.

\* \* \*

## One WD-11 Without Amplification

From O. E. Slavbrough, 2853 Shriver Ave., Indianapolis, Ind.

**I** HAVE been reading the records of the "DX Nite Owls" in RADIO WORLD and I am sending my list for the night of March 9. All stations were received on a single-circuit regenerative set, built by myself using one WD-11 tube without amplification.

WLAG, Minneapolis, 500 miles; WOC, Davenport, Ia., 285; WCK and KSD, St. Louis, Mo., 260; WIAR, Paducah, Ky., 270; WGY, Schenectady, 685; WBAO, Dallas, Texas, 805; WDAJ, College Park, Ga., 355; WSB and WGM, Atlanta, Ga., 345; WOS, Jefferson City, Mo., 345; WSY, Birmingham, Ala., 460; WDAF, Kansas City, 490; WMC, Memphis, Tenn., 385; KDKA, Pittsburgh, Pa., 345; WMAQ, WDAP and KYW, Chicago, Ill., 200; WAAP, Wichita, Kan., 635; WBAA, West Lafayette, Ind., 60. KFI and KPK, Los Angeles, Cal., 1,895; KFDL, Denver, Col., 1,005 miles.

(Continued on page 24)

## Why Magnavox is the Reproducer Supreme

**O**FFICIAL tests with the oscillograph prove that the Magnavox electro-dynamic receiver reproduces incoming wave forms with maximum accuracy.

The Magnavox can be used with any receiving set—the better the set, the more Magnavox can do for you.

When you purchase a Magnavox you possess an instrument of the very highest quality and efficiency.



**R2 Magnavox Radio with 18-inch horn**  
(as illustrated)

This instrument is intended for those who wish the utmost in amplifying power; for clubs, hotels, dance halls, large audiences, etc. It requires only .6 of an ampere for the field. Price, \$60.00

## R3 Magnavox Radio with 14-inch horn

The ideal instrument for use in homes, offices, amateur stations, etc. Same in principle and construction as Type R2. Price, \$35.00

## Model C Magnavox Power Amplifier

For use with the Magnavox Radio and insures getting the largest possible power input.

2-stage, \$55.00  
3-stage, \$75.00

Magnavox products can be had of good dealers everywhere.

**THE MAGNAVOX CO.**  
Oakland, California  
N. Y. Office: 370 Seventh Ave.

# Radio Merchandising

Advertising Rates: Display, \$5.00 an inch, \$150.00 a page. Classified Quick-Action Advertising, 5 cents a word.

Telephone Bryant 4796.

## Congratulations from a Competent Authority

Editor, RADIO WORLD:

Upon the occasion of your special anniversary number of RADIO WORLD, I am happy in the opportunity to congratulate you on the tremendous strides which your publication has made in its first year.

Your own unfailing courage and the energy and devotion of your associates have given us a weekly radio publication that many thousands of us in radio deeply appreciate.

You have the best wishes of everyone of us in the Sleeper Radio Corporation for a big prosperous new year and many years like it to come.

Cordially yours,  
New York, GORDON C. SLEEPER.  
March 28, 1923.

## New Nantucket Lightship to Have Radio

THE present Nantucket, Mass., lightship will be displaced by the latest and best equipped lightship in the service about the first of June, according to the Commissioner of Lighthouses. Inbound transatlantic liners will be greatly aided against the dangers of fogs and the treacherous shoals in these waters by the installation of a radio signal set capable of communicating with ships within a hundred miles of the shoals. The present lightship has no radio service and during foggy weather the light is not discernible. When the radio signaling apparatus on the new lightship is installed inbound liners will be able to get their bearings in all kinds of weather.

## Secretaries of Radio Clubs, Attention!

THE secretaries of radio clubs throughout the United States are requested to send to RADIO WORLD any news of interest to other radio enthusiasts which may come to their notice at club meetings or elsewhere. RADIO WORLD desires to co-operate to the fullest extent with clubs and other organizations in all their progressive efforts.

**RADIO WORLD SELLS FAST IN CALIFORNIA**  
RADIO WORLD is the best of them all. Your publication is all sold out on the local newsstands almost as soon as they arrive here.  
HENRY FIEDLER,  
1169 West 38th Place, Los Angeles, Cal.

## New Radio and Electric Firms

(The new firms and corporations mentioned in these columns can be reached directly or by communicating with the attorneys, whose addresses are given whenever possible.)

The Colorado Springs, Col., Radio Co., Inc. S. L. Maynard and others.

Haverford Cycle Sales Co., 522 Tenth St., N. W., Washington, D. C., is adding a radio department.

Keller Radio Co., 9 South St., Belleville, Ill. C. J. Keller, proprietor.

Atlas Radio Store, 345 South Clark St., Chicago, Ill.

Congress Radio Co., Congress and State Sts., Chicago, Ill.

Triangle Radio Store, Robey, Lincoln and Irving Park Boulevard, Chicago, Ill.

V. B. Thompson, Girard, Ill. Adding radio department.

J. O. Hank, Newton, Ill. Adding radio department.

Radio Club, Inc., Laporte, Ind. C. M. Cooke and others.

Eden Bros., Ainsworth, Ia. Adding radio department.

Hawkeye Radio & Supply Co., 505 Eighth St., Des Moines, Ia. A. J. Tingley and M. C. Haigh, proprietors.

Cut Rate Radio Co., Fifth and Quincy Sts., Topeka, Kan.

Washington Radio Supply Co., 802 Washington St., Boston, Mass.

Marle Duston Radio Co., 407 East Fort St., Detroit, Mich.

Guy Schweer Electric Co., East Franklin St., Clinton, Mo. Adding radio department.

Quade Auto Supply Co., Harrisonville, Mo. Adding radio department.

Main Radio Co., 3032 Main St., Kansas City, Mo.

Ligon-Renick Sales Co., Odessa, Mo.

Paramount Radio Corporation, 5135 Washington St., St. Louis, Mo. R. H. Cone and others.

Smith-Davidson Motor Co., Auburn, Neb. Adding radio department.

## Coming Events

PERMANENT RADIO FAIR FOR BUYERS, Hotel Imperial, New York City. Open from September, 1922, to May, 1923.

ANNUAL HOME AND CITY BEAUTIFUL EXPOSITION, featuring radio exhibits. Atlantic City, N. J., June 16 to September 8, 1923.

RADIO AND ELECTRICAL EXPOSITION, including amateur home-made set contest, San Francisco, Cal., April 3 to 8, inclusive.

## The Dictogrand Radio Loud Speaker

THE Dictograph Products Corporation, 220 West 42nd Street, New York City, has placed on the market the new Dictogrand radio loud speaker. It is mounted in a mahogany finished hardwood cabinet. An adjusting dial in the front of the cabinet regulates the air gap between the pole shoes and an especially made secret alloy diaphragm. The adjusting mechanism operates through a shaft, pinion and gear. Changing the air gap varies the pull of the magnet upon the diaphragm, thus enabling the loud speaker to be tuned up in complete harmony and resonance with the receiving set.

The Dictogrand radio loud speaker is designed to operate on any vacuum tube receiving sets, using two stages of amplification, but good results are often secured on sets employing but one stage of amplification, dependent upon the type of set used and the distance from the broadcasting station. This loud speaker requires no external batteries. In its design and construction is concentrated 20 years leadership in the art of sensitive sound transmission. Dictograph experience in the manufacture of the Acousticon for the deaf, the secret service dictograph, and the Dictograph system of interior telephones, has enabled the production of this perfected radio loud speaker.

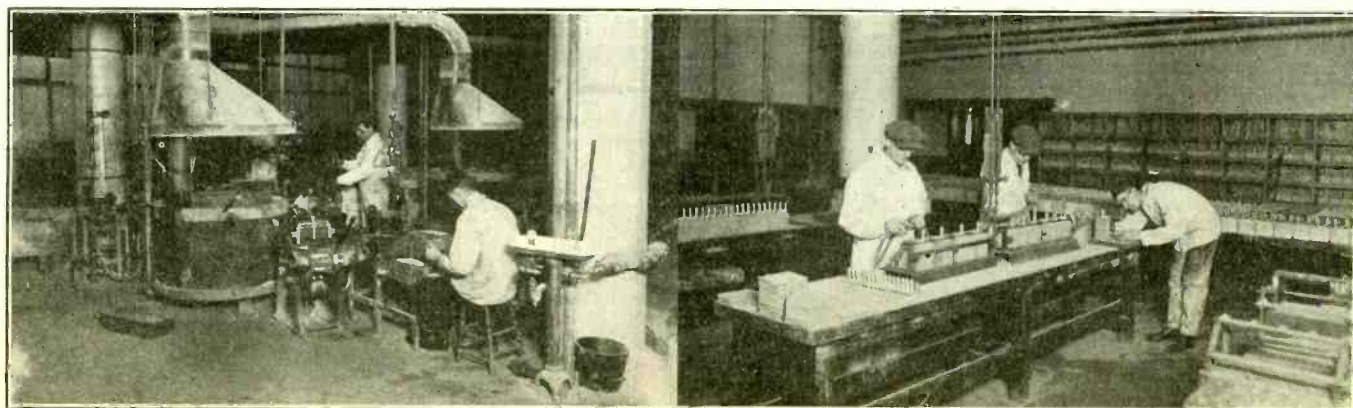
## Crosley Produces "Radarios"

The Crosley Manufacturing Company, Cincinnati, Ohio, operating radio broadcasting station WLW, calls attention to their original and novel plays which they have christened "radarios." They are a creation of Robert F. Stayman, editor of the Crosley "Radio Weekly." Radarios will continue to be on the weekly programs sent out from the large station at Cincinnati. They were started some time ago and have proven very successful, as the written applause (telegrams and letters) testify.

## International Travel Exposition

The second annual International Travel Exposition, will be held at Grand Central Palace, New York City, from April 9 to 14. Although many radio fans do their travelling through the ether, no doubt others will be interested in the exhibits and features of this exposition which have been gathered from the four corners of the earth.

## Where Some of Your Storage Batteries are Made



Showing employees at work in two departments at the Westinghouse Union Battery Company, Swissvale, Pa.

# CROSLLEY Model Vc \$20 Regenerative Receiver Set



Licensed under Armstrong U.S. Patent No. 1,113,149

There is no other one-tube set being manufactured today that will give better results than produced by the Crosley Model Vc Regenerative Radio Receiver. The proud owner of one of these instruments can bring in any powerful station in the United States. Stations more than 1,000 miles away are being copied regularly on this set. Equal in every respect to the guaranteed performance of this instrument are its finish and appearance.

The trade-name "Crosley" is used by permission of the Crosley Manufacturing Co.

FOR SALE BY GOOD DEALERS EVERYWHERE

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The Precision Equipment Co.

Powel Crosley, Jr., President

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COMBINED WITH .00025 MFD. MICON CONDENSER ..... \$1.00

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VARIABLE RESISTANCE LEAK WITHOUT CONDENSER ..... 75c

At your dealers—otherwise send purchase price and you will be supplied postpaid.

Chas. Freshman Co., Inc. 106 Seventh Ave. New York City

### A B C of Aviation

By CAPT. V. W. PAGE. This book describes the basic principles of aviation, tells how a balloon or dirigible is made and why it floats in the air. Describes how an airplane flies. It shows in detail the different parts of an airplane, what they are and what they do. Describes all types of airplanes and how they differ in construction; as well as detailing the advantages and disadvantages of different types of aircraft. It includes a complete dictionary of aviation terms and clear drawings of leading airplanes. The reader will find simple instructions for unpacking, setting up and rigging airplanes. A full description of airplane control principles is given and methods of flying are discussed at length. This book answers every question one can ask about modern aircraft, their construction and operation. 275 pages, 130 specially made illustrations with 7 plates. Price, \$2.50

THE COLUMBIA PRINT 1493 Broadway, New York City

Fifty-two issues for \$6.00. Sub. Department, Radio World, 1493 Broadway, New York City.

## Composers and Publishers Want Radio Users to Pay Fee

Representatives of the American Society of Composers, Authors and Publishers have been in conference with representatives of great broadcasting stations trying to adjust questions of alleged infringement of copyright in connection with radio. It was proposed that the government be requested to collect a license fee from every radio receiving set in the country to compensate music and song writers whose work is used by the broadcasting stations.

E. C. Mills, Chairman of the Executive Board of the Music Publishers' Association, urged that the 588 public broadcasting stations be reduced to 40 and that the selection of programs be controlled by officials representing the public in the vicinity of the station and by others representing the Department of Commerce.

A number of interesting points were taken up in conference between the copyright owners and the radio men. After a statement of the position of the song and music writers, A. H. Griswold, representing the American Telephone and Telegraph Company, asked:

"Is it your position that, having received a royalty on music that is recorded on a phonograph record or player roll, you would expect additional royalties if that roll or record is played again at a broadcasting station?"

"Absolutely," replied Mr. Mills. "I will explain that point. The royalty that we receive under the law from the manufacture of a phonograph record, for the right to mechanically reproduce a copyrighted musical composition, is in consideration of a right to manufacture, not a right to publicly perform; and the right to manufacture does not include the right to publicly perform."

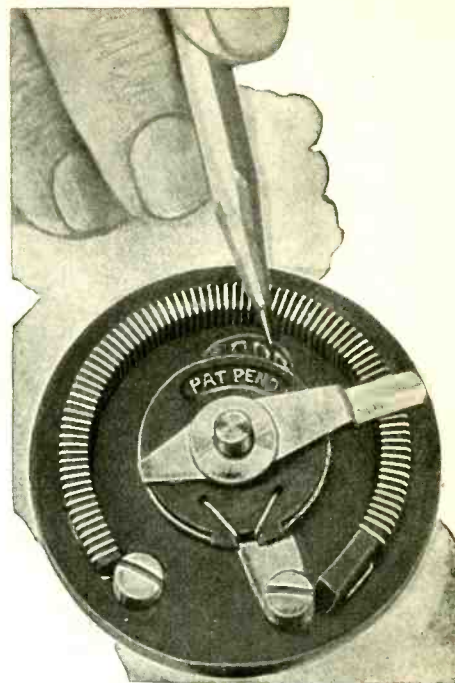
William H. Easton, Vice President of the Westinghouse Electric & Mfg. Company, here interrupted:

"A radio is put in a restaurant. If it has been installed there and is used to play a broadcast program for the diners, is there liability for a third payment?"

"Certainly," replied Mr. Mills. "This would constitute a public performance for profit."

"It seems to me," said Mr. Easton, "that if you were paid once for public performance on that composition, that two payments should not be made for the same rights."

The song writers and composers are accused by the radio men of failing to make allowance for the value rendered by radio in introducing music to the public. The former deny the benefit.



## Fada Rheostats and Potentiometers

Over a million and a half FADA receiving tube rheostats alone were manufactured during 1922.

FADA vernier rheostats and potentiometers are fast becoming the favorite with the radiophans who construct their own receivers.

120-A Rheostat (5 ohm)...	\$0.75
121-A Power Rheostat (1½ ohm) .....	1.20
150-A Vernier Rheostat (5 ohm) .....	1.25
151-A Vernier Attachment. . .	.50
152-A Potentiometer (200 ohm) .....	1.00
153-A Rheostat (8 ohm)...	1.00
154-A Potentiometer (400 ohm) .....	1.00
155-A Vernier Rheostat (8 ohm) .....	1.50

Send 10c. for FADA Handbook

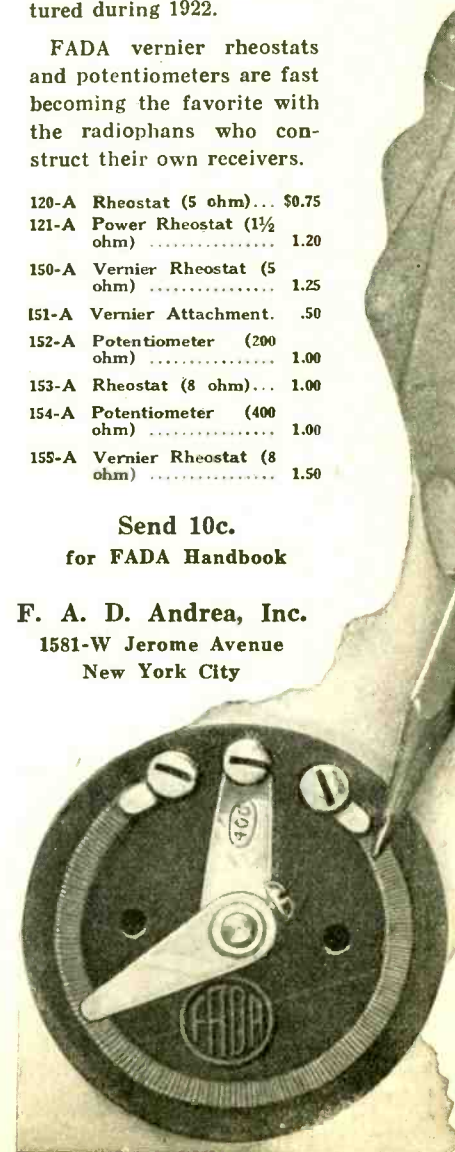
F. A. D. Andrea, Inc. 1581-W Jerome Avenue New York City

## Radio Compass Saves a Sinking Crew

Radio advices received last week by the Cosulich Line, at its New York City offices, stated that twenty-four members of the crew of the sinking Italian freighter "Giulia" had been rescued following three attempts on the part of life boats to reach the vessel. The message from Captain Ettore Zar of the "President Wilson," which made the rescue, stated that he had located the "Giulia" by means of the radio compass. The SOS call was picked up at a distance of 370 miles.

## Radio Aids in Reporting Crop Damage

The Bureau of Agricultural Economics Department of Agriculture, has estimated the damage to the peach crop in Georgia, by the recent freeze at 37 per cent. The statistician of the service pays this official tribute to radio in his report: "This is the first crop report on record where material was secured by aid of radio. Acknowledgement is made of its inestimable assistance."



**RADIO TUBES REPAIRED**

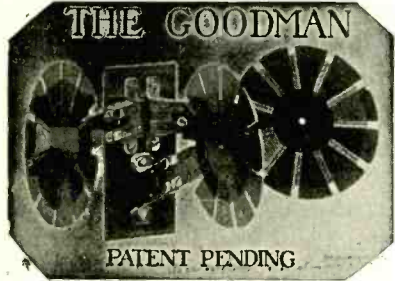
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No outside connecting hardware used—reducing capacity losses. Rugged—Solid. Size 4 1/4" x 4 3/4" x 3".  
*Guaranteed by manufacturer direct to user.*  
Retail price \$2.50  
Ask your dealer  
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**National Radio Products Corp.**

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- One Year, 52 Issues..... 6.00 .....
- Add \$1.00 a Year to Foreign Postage, 50c for Canadian Postage. ....

**DX Nite Owls**

(Continued from page 21)

**Watch Your Heels, Mr. Anthony**

From Hugh Taylor, 1434 Meridian Pl., N. W., Washington, D. C.

ON running across Mr. Robert Anthony's claim to the "Radio Golf" record in the Jan. 27th issue of the **RADIO WORLD**, I decided to send in my record. I have a single-circuit regenerative detector and two stages of audio-frequency. The following are the stations received on March 8, 9, and 10:

March 8, Three Hours' Play—WAC, Schenectady, N. Y., 400 miles; WOR, Newark, N. J., 218; WIP, Philadelphia, Pa., 136; WBZ, Springfield, Mass., 367; WEA, New York, N. Y., 228; WJZ, Newark, N. J., 218; CFCF, Montreal, Canada, 669; WSB, Atlanta, Ga., 648; WCAD, Canton, N. Y., 200; WDAO, College Park, Ga., 700; WCAE, Pittsburgh, Pa., 302; KSD, St. Louis, Mo., 824; WHAS, Louisville, Ky., 663; KDKA, Pittsburgh, Pa., 302; WNAC, Boston, Mass., 463; WSV, Little Rock, Ark., 1,200 miles. Six local stations. Total, 7,544 miles.

March 9, Three Hours' 30 Minutes' Play—WOR, Newark, N. J., 218 miles; WUZ, Newark, N. J., 218; WEA, New York, N. Y., 228; WGM, Atlanta, Ga., 648; WGY, Schenectady, N. Y., 400; WGI, Medford Hillside, Mass., 367; WEAF, New York, N. Y., 228; WJZ, Newark, N. J., 218; WCAE, Pittsburgh, Pa., 302; KSD, St. Louis, Mo., 824; WMC, Memphis, Tenn., 898; KDKA, Pittsburgh, Pa., 302; WGV, New Orleans, La., 1,200. Nine local stations. Total, 7,892 miles.

March 10, Five Hours' 45 Minutes' Play—WJZ, Newark, N. J., 218 miles; WOR, Newark, N. J., 218; WGY, Schenectady, N. Y., 400; WEA, New York, N. Y., 228; WOC, Davenport, Ia., 1,000; WHAS, Louisville, Ky., 663; WHAB, Galveston, Texas, 1,500; WDAY, Fargo, N. D., 1,525; WCAE, Pittsburgh, Pa., 302; CFCA, Toronto, Canada, 475; WMC, Memphis, Tenn.,

989; WNAC, Boston, Mass., 463; WLAG, Minneapolis, Minn., 210; WMB, Auburn, Maine, 675; WLAK, Bellow Falls, Vt., 576; WJAZ, Chicago, Ill., 770; 8XN, Lewisburg, Pa., 225; KDKA, Pittsburgh, Pa., 302; WIP, Philadelphia, Pa., 236; WBZ, Springfield, Mass., 367; WHAM, Rochester, N. Y., 394; WSB, Atlanta, Ga., 648; CFCF, Montreal, Canada, 667; WDAF, Kansas City, Mo., 1,171; KFI, Los Angeles, Cal., 2,980; WGM, Atlanta, Ga., 648; WDAU, College Park, Ga., 700; WDAP, Chicago, Ill., 790; WFI, Philadelphia, Pa., 136; PWX, Havana, Cuba, 1,590; WLAM, Springfield, Ohio, 490; WKY, Oklahoma City, Okla., 1,416; WPAL, Columbus, Ohio, 487. Total, 18,408 miles.

Grand total, 40,628 miles in 12 hours, 15 minutes. Consider my distance and my time. The distance is further, the time shorter. I leave it for the Editor to decide. Mr. Robert Anthony's time was 14 hours and 20 minutes. Distance, 39,348 miles.

\* \* \*

**Not Pretentious, But Strictly DX**

From F. R. Tilton, Jr., 287 New York Ave., Brooklyn, N. Y.

AM enclosing list of stations I have received with a single-tube regenerative set. The farthest I have received is Fort Worth, Texas, a distance of 1,850 miles:

WDAP, Chicago, Ill.; WBAP, Fort Worth, Texas; WDAF, Kansas City, Mo.; KDKA, Pittsburgh, Pa.; WHAS, Louisville, Ky.; WAAZ, Emporia, Kan.; WHAZ, Troy, N. Y.; WNAC, Boston, Mass.; WEY, Wichita, Kan.; KSD, St. Louis, Mo.; KYW, Chicago, Ill.; PWX, Havana, Cuba; WOH, Indianapolis, Ind.; WOZ, Richmond, Ind.; WOC, Davenport, Ia.; WWJ, Detroit, Mich.; WWI, Dearborn, Mich.; WSB, Atlanta, Ga.; WBZ, Springfield, Mass.; WGY, Schenectady, N. Y.; WGI, Medford Hillside, Mass.; WFI, Philadelphia, Pa.; WOO, Philadelphia, Pa.; WIP, Philadelphia, Pa.

The majority of the above stations have been received after 10 o'clock at night. Not counting the local stations.

\* \* \*

**Another Single Circuit Record**

From Marvin Shew, 64 Long Branch Ave., Long Branch, N. J.

AS a constant reader of **RADIO WORLD** I wish to state my interest in the department, "With the DX Nite Owls." My record is not very impressive, but might be of interest to other readers. The hook-up I am using consists of detector and one-step of audio-amplification. I have heard 35 stations during the two weeks that my set has been in use. Some of them are: CKAC, WOC, PWX, CHXC, CEAC, 2,000 miles; WWJ, WBAP, 1,400 miles; WPO, WSB, CFCA, WHAS, WDAP, KYW, KFL, 2,400 miles; WKAQ, 1,600 miles; WDAF, KDYS, 1,900; besides others. My hook-up is a single circuit with which I have heard 12 different states. The antenna I use is 50 feet long, consisting of one wire, 25 feet above the ground.

**RADIO BROADCASTING MAP**

FOR the benefit of those interested in Radio and those who are becoming interested, Rand McNally & Company has prepared a publication containing a wealth of information of greatest value. It shows in the most comprehensive way, the location of the broadcasting stations, gives their classification, the call letters, wave lengths, ownership, etc., of each. Everyone who wishes to get the maximum pleasure and enjoyment from Radio should have a Rand McNally Radio Map of United States. It is complete, accurate and up-to-date. The Rand McNally Radio Map of United States is 28x30 inches in size. The locations of broadcasting stations are shown by distinctive symbols. The call letters of each station are given, also the wave lengths of each. The Radio Districts with numbers are shown in red and the Radio Relay Divisions are in blue. Time zones are included. Alphabetical lists of stations and alphabetical lists of call letters are in the margins. Convenient pocket form with cover.

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FOR BOYS AND GIRLS

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It lists all our radio parts and supplies.

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## RADIO WORLD

TELEPHONE, BRYANT 4795  
PUBLISHED EVERY WEDNESDAY (Dated SATURDAY OF SAME WEEK)  
FROM PUBLICATION OFFICE  
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Managing Editor: Stephen L. Coles  
Technical Editor: Robert L. Dougherty

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While every possible care is taken to state correctly matters of fact and opinion in technical and general writings covering the radio field, and every line printed is gone over with a scrupulous regard for the facts, the publisher disclaims any responsibility for statements regarding questions of patents, priority of claims, the proper working out of technical problems, or other matters that may be printed in good faith and on information furnished by those supposed to be trustworthy. This statement is made in good faith and to save time and controversy in matters over which the publisher cannot possibly have control.

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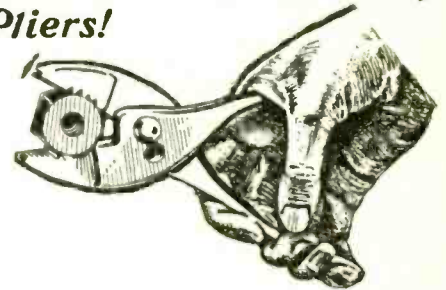
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YOU can do better radio repair work with a good pair of slip joint pliers—especially if they're forged of steel, and designed to stand a lot of hard work.

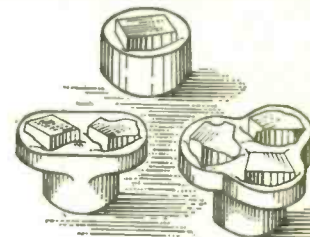
### "Red Devil" Pliers

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"Red Devil" Slip Joint Plier No. 924—6½-in., shown above, combines a shear cutter, burner grip and screw driver. Price 50c at dealers or us.

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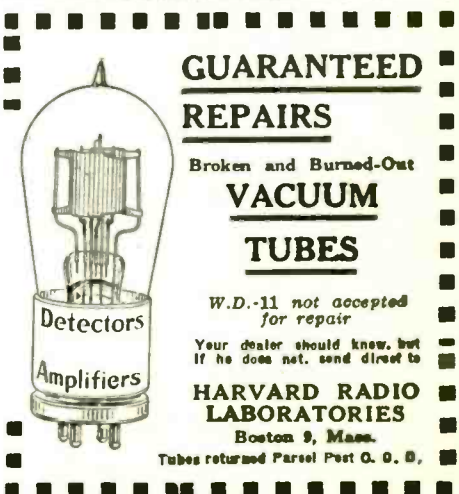
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## Wants Phonograph Music Eliminated from All Stations

EDITOR, RADIO WORLD: I have observed a communication from one of your radio fans questioning whether WHN should broadcast after 10:30 p. m. I very seldom receive concerts from this station, but when I do receive I have found the music acceptable. I believe that the great majority of listeners-in prefer this nearby music to that of distant stations, the reception of which is uncertain.

There is no doubt there are a great number of radio fans who have the distance itch—myself included—but we must realize that where there is a station broadcasting acceptable material it is giving amusement to the great majority of listeners. But when we have a station which makes a habit of passing out only phonograph music I think that station should be silenced. I make particular reference to the Paterson station, WBAN. It is common practice among a large number of fans in Paterson to shut off their receiving sets while WBAN is operating. Their modulation is exceedingly poor; and this adds insult to injury, especially after having listened to a first-class concert from WJZ, and then WBAN comes in with its noise and phonograph music. If the station would put out acceptable music, or lectures, or anything of an educational nature, I am sure listening in to distance stations would come second.

There is another small station which broadcasts entertaining material, and that is WRW, of Tarrytown, N. Y. When this station is operating it is generally at a late hour, but it does not interfere with distance work if the fan is so inclined.

There is only one other station I know of that is as bad as WBAN regarding the quality of its broadcasting material, but I have so far been unable to get its call.

I think it would be well for RADIO WORLD to carry on propaganda to have continuous performance of phonograph music eliminated from all stations.

Yours very truly,

10 Rodney St., ARTHUR C. MASON.  
Glen Rock, N. J.

## WILLARD

4/7/23

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Dept. R. W., 291 Broadway, New York

#### REINARTZ CIRCUIT

##### EVERY PART COMPLETE

1 Reinartz wound coil, 1 tube socket, 1 rheostat, 1 23-plate .0005 MFD variable condenser, 1 13-plate .00025 MFD variable condenser, 3 inductance switches, 16 switch points and nuts, 4 switch stops and nuts, 2-3" dials, 8 binding posts, 1 variable grid leak, 1 .002 MFD phone condenser, necessary bus bar wire, 1 high-grade Radion panel and diagram and complete instructions.....\$10.00

#### FLEWELLING CIRCUIT

##### EVERY PART COMPLETE

2 honeycomb coils, 1 2-coil mounting, 2 coil plugs, 3 .006 condensers, 1 variable grid leak, 1 grid leak, 1 23-plate .0005 MFD variable condenser, 1 Vernier rheostat, 1 tube socket, 8 binding posts, 20 test bus bar wire, 1 high-grade RADION panel, 1 3" dial and the Radio Digest Booklet on Operation and Construction of Circuit.....\$11.00

#### CONDENSERS

3 Plate Variable; value, \$1.75.....\$1.05  
13 Plate Variable; value, \$2.50.....1.20  
23 Plate Variable; value, \$3.50.....1.35  
43 Plate Variable; value \$4.50.....1.85

13 Plate VERNIER; value, \$5.50.....\$3.75  
23 Plate VERNIER; value, \$8.00.....4.00  
43 Plate VERNIER; value, \$9.50.....4.25

Reinartz Coils; value, \$2.50.....1.75

V. T. SOCKETS—Nickel brass sleeve, composition base; value, \$1.00; special at .....50

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Honeycomb Coils, 50 turns, mounted...95  
Honeycomb Coils, 75 turns, mounted...1.00

Double Coil Mountings .....2.45  
Triple Coil Mountings .....3.35

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FILAMENT RHEOSTAT — Condensite base; value, \$1.10; special at .....70

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BEST QUALITY JACKS, Single circuit; value, 65c; special at .....30

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VARIOCOUPLER — Celeron condensite and Litz Wire wound secondary; value \$4.50; special .....3.25

THREE-INCH DIALS—Unbreakable—heat resisting composition—high finish; special .....30

TWO-INCH DIALS—Same design—for rheostats and potentiometer; special...25

EXTRA SPECIAL — Telephone 3000 Ohms Headsets; \$9.00 value; reduced to .....3.50

RAYMOND VERNIER RHEOSTATS—Value, \$1.50; special .....95

Aluminum Loud Speaking Horn—Nickel Plated; list \$8.00 .....3.75

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Illustrating and describing all our products.

Every article advertised above is guaranteed both by the manufacturer and by us—Mail orders filled immediately—transportation PREPAID on all orders of \$5.00 or over east of the Mississippi River. All others include postage.

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Specially designed cross-section insures minimum loss. Enamel, graduation and numbers are particularly clear. Knob so shaped that fingers do not interfere with easy, accurate reading.

Na-ald dials are moulded from genuine Na-ald material. Rheostat heat will not affect them. They run true; cannot warp.

3-INCH DIAL 35c  
2-inch dial for rheostat; potentiometer use, 50c; 3½" dial, 75c.

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(Complete with Tubes, "B" Battery, "A" Battery, Phones, Aerial, etc.)

We will send any set for your approval, you may try it under any and all conditions for ten days, if you are not absolutely satisfied send us the set, and we will return your money.

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Feb. 12, 1923.

Sunbeam Electric Co., New York City:—

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(Signed) EDW. L. NUTE.

Sunbeam Long Wave Variocoupler,  
150 to 3000 Meters, Complete  
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Mounted .....\$11.95

Coil Only 3 Layer, Bank Wound,  
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Old copies of RADIO WORLD for new copies. The publishers are short of the following numbers: April 22, May 20, June 24, October 21, December 2. Mail us these copies and we will send you a copy of a current issue, or extend your subscription one issue. RADIO WORLD, 1493 Broadway, New York.



**Court Asked, "Who Owns the Ether?"**

THE first court fight over the freedom of the air in radio will take place at the Livingston County Court House at Pontiac, Ill., at the April term. Edward McWilliams, wealthy President of the State Bank of Dwight, last November was granted a temporary injunction restraining G. Wylie Berman, eighteen, an amateur wireless operator at Dwight, from using his broadcasting station because it is alleged to have interfered with the receiving of radio telephone returns in the McWilliams home on election night. Herbert Hoover, Secretary of Commerce; Mitchell Lewis, machine gun manufacturer of New York, and Hiram Percy Maxim, President of the American Radio Relay League, are expected to attend the hearing.

**Staten Island Man Denies He "Jazzed" Paris by Radio**

THEY are having a hot discussion in Paris as to whether amateurs there actually received last week a wireless message from a Mr. Webb of Tottenville, Staten Island, as has been asserted. W. S. Webb of Tottenville has denied that he was the author of the radio "jazz" that interrupted the concerts of Paris. He said he had a radio equipment, but that it was not suitable for sending messages. Elmore Ragues, another resident of Tottenville, has the only set there powerful enough to send music to Paris. But Mr. Ragues denied that he had forwarded any "jazz." He said that he had no license to send out music, his sending activity being limited to code. The French authorities are still searching for the "wild cat" station.

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Murdock 2000 ohm double Headsets.....	5.00	Seneca "B" Batteries, 22 V, storage.....	11.50
Murdock 3000 ohm double Headsets.....	5.50	Red Seal Dry Cells, 1 1/2 V, for W D-11.....	1.40
Murdock 80 ohm Receivers.....	1.50	Red Seal Sparkers, for W D-11 tubes.....	1.80
Double Headbands, fits all phones.....	.75	Acme Amplifying Transformers.....	4.50
Single Headbands, fits all phones.....	.50	Radio Corp. U. V. 712 Amp. Transformers.....	7.00
Double Phone Cords—six feet.....	.50	Radio Corp. U. V. 714 Radio Freq. Trans.....	6.50
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G. A. Grid Condensers, .0005 mfd.....	.20	Paragon Rheostat.....	1.50
Moulded Phone Condensers, .001 mfd.....	.50	King Rheostat PR 536.....	3.00
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Westwyre 3 Plate Variable Condensers.....	2.25	Whitall 600 Meter Variocouplers.....	2.75
Westwyre 11 Plate Variable Condensers.....	3.30	Paragon Crystal Detectors with galena.....	1.00
Westwyre 23 Plate Variable Condensers.....	3.80	Whitall double tested galena, mounted.....	.25
Westwyre 43 Plate Variable Condensers.....	4.75	Whitall double tested galena, unmtd.....	.25
Westwyre 11 Plate Var. Vernier Cond.....	5.25	Woodsmetal for mounting crystals.....	.10
Westwyre 23 Plate Var. Vernier Cond.....	5.75	Switch Stops, 1/2 x 1/2-inch.....	per dozen .10
Westwyre 43 Plate Var. Vernier Cond.....	6.75	Whitall Switchlever, 1 1/2-inch radius.....	per pair .05
Dials furnished with all Var. Cond.....	No charge	Copper Soldering Lugs.....	per doz. .10
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12.00 King Ampitone Loud Speaker Horns.....	5.75
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Do you like to reach over states and pull in the breezy line from the far West or hot stuff from down in Texas, or maybe the business twang of the good old East? Now that you've answered this questionnaire, remember that if you want Distance you want instruments built for Distance.

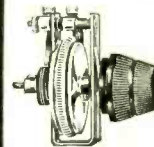
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Genuine Cutler Hammer Product. Necessary for fine adjustment. Reg. Price, \$1.50.  
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 Use the Super Radio Frequency Transformer and the Super Tuner and get real results. Eighteen months exhaustive experimenting before placing on the market insures you the very best and most efficient R. F. Transformer. Designed on an entirely new principle and positively guaranteed. Write at once for our new trial proposition and other information. We have a new Super B. F. Circuit. It's free.  
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THE NEW E.S.X. is the first and only attachment that can be used with one or two receivers. Thousands of E.S.X. Attachments in use and every one gives satisfaction. Needless to say, your Phonograph tone chamber is superior to a horn. Send \$2.00 and mention make of Phonograph

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Have you seen the hook-up with complete panel layout in full size and all constructional details in RADIO WORLD No. 43, dated Jan. 30?  
 This hook-up actually goes out and drags the distance in, and lays it at your table.  
 All that is necessary is to lay the full-page diagram of the panel on your own panel and drill and mark your holes. Simple, isn't it?  
 If you haven't this copy, send 15 cents to Radio World, 1493 Broadway, New York, N. Y., and copy will be mailed you. Or start your subscription with that number.

**Department of Agriculture  
Wants a Radio News Editor**

THE United States Civil Service Commission announces the following open competitive examination:

The receipt of applications will close May 8. The examination is to fill a vacancy in the office of the Secretary of Agriculture, Washington, D. C., at entrance salaries from \$1,800 to \$2,100 a year, plus the increase of \$20 a month granted by Congress, and vacancies in positions requiring similar qualifications.

The duties of radio news editor require suitable experience in either the agricultural or daily newspaper field. It is necessary that appointees be able to comprehend agricultural and scientific work being conducted by the Department of Agriculture, and to put such matter into popular form so that it easily may be sent out over the radio and understood by the layman.

Competitors will not be required to report for examination at any place but will be rated on a practical test, education and experience, and published newspaper articles prepared by the applicant, to be filed with the application.

Full information and application blanks may be obtained from the United States Civil Service Commission, Washington, D. C., or the secretary of the board of U. S. civil service examiners at the post office or custom house in any city.

**Brothers United by Radio After  
42 Years**

THE Schenectady radio broadcasting station of the General Electric Company—WGY—was the means of reuniting brothers who had been separated for 42 years. Recently David Hill Voorhees, who lives near Schenectady, N. Y., sought the aid of Chief of Police James W. Rynex, of Schenectady, in locating his brother and sister, from whom he became separated 42 years before, when their parents died and the children were adopted by three different families. At the request of Chief Rynex WGY broadcast a message from Mr. Voorhees, who asked that his brother and sister get in communication with him. The message was put into the air, and the following Sunday Mr. Voorhees had dinner with his brother, Howard Hill, a sign painter, in Gloversville, N. Y. No word has yet been received from the sister.

**Western Electric Sets Sales  
Record**

THE Western Electric Company, Inc., which is controlled by the American Telephone & Telegraph Company, reports for the year ended December 31, 1922, a surplus, after all charges, including interest and dividends, of \$1,144,936 against \$823,997 in 1921. Gross sales were the highest in the company's history, topping the previous high record of 1920 by nearly \$5,000,000 and exceeding the 1921 mark by approximately \$21,000,000. The gross sales for 1922 were \$210,941,004.

**1000 Miles for \$15**

Complete set of parts for this wonderful set consists of 7x12 panel, 180° Bakelite coupler, 43 plate condenser, moulded ends, 8 Read 'Em Binding Posts, Framingham rheostat, socket, grid leak condenser, 2 dials, 2 switches, points, stops, bus wire, spaghetti and diagram. Better apparatus not obtainable at any price.

Parts for two-step Amplifier .....\$15.00  
 \$3.50 Reinartz Coils ..... 2.50  
 \$5.00 Jefferson Transformers ..... 3.95  
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We send full Aerial Equipment and Ducon Antenna Electric Light Plug, "B" Battery and Double Phone Head Set. All ready to "listen in" with the addition of U. V. or W. D. Tube and "A" Battery.

The Secret Hook-up of this Set gets D-X, Single Control.

*We guarantee this Set and ship to you prepaid for \$24.39.*

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**TUBES REPAIRED  
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**\$3.50 AND POSTAGE**

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such as U. V. 200, U. V. 201,  
U. V. 201A Repaired and  
Guaranteed.**

**(No V. T. 1 or V. T. 2)**

*Mail Orders Solicited  
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AMMETER With  
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**WE SELL ONLY STANDARD  
PARTS AT LOWEST PRICES**

Klosner Vernier Rheostat .....	\$0.70
Atwater-Kent Variometers .....	6.75
Atwater-Kent Variocouplers .....	6.75
Raven Molded Variometer .....	4.00
Westinghouse Dry Cell Tube.....	5.50
French Detector Tubes .....	4.00
French Amplifying Tubes.....	4.50
U. V. 200 Tubes.....	4.40
U. V. 201 Tubes.....	5.75
A. & P. Detector Tubes.....	3.75
Cunningham 301 Tubes.....	5.75
A. B. C. 23 Pl. Condenser.....	1.90
A. B. C. 43 Pl. Condenser.....	2.30
A. B. C. 23 Pl. Vernier Condenser.....	3.75
A. B. C. 43 Pl. Vernier Condenser.....	4.00
Acme Audio Transformer.....	4.00
Original Baldwin Type C Phones (double) .....	8.75
Baldwin Type C (single).....	4.50
Stromberg-Carlson Phones .....	6.00
Ultra Tone Phones, 2200 Ohms.....	3.75
Federal Phones .....	5.00
Bradleystats .....	1.70
150-3000 Meter Silk Wound 3 Bank Wound Coil .....	3.50
Woodhorn Loud Speaker.....	5.50
King 600 Meter Variometer.....	3.00
N & K 6000 Ohm Phones.....	6.50

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**S. S. "Leviathan" to Have Big-  
gest Radio Equipment**

**E**CLIPSED only in importance by her powerful machinery and delicate controls the radio installation aboard the "Leviathan," which re-enters the trans-Atlantic service some time in June flying the U. S. Lines flag, will be the most powerful and elaborate steamship radio equipment in the world. The contract to equip the "Leviathan" with a super-power marine radio installation has just been signed with the U. S. Shipping Board by the Radio Corporation of America and work in connection therewith is now in progress. The completion of this work will give to America the distinction of radio supremacy upon the seas.

Once a transporter of American dough-boys and now a palatial hotel, the "Leviathan's" radio equipment will enable her passengers to exchange messages with two continents regardless of her position on the high seas. With equipment six times as powerful as that carried by the average ocean greyhound, uninterrupted communication with points 3000 miles distant is assured. Upon leaving her berth in New York Harbor, the "Leviathan's" radio officers will be able to link the huge vessel with various marine centers in Europe and to communicate with America when leaving European ports.

In addition to telegraph service, a radio telephone installation which will provide voice contact with other vessels and shore stations is also to be installed. While it is not expected that a commercial telephone service will be inaugurated immediately upon the "Leviathan" going into commission it is quite probable that shore stations will in the no distant future be erected to handle wireless telephone traffic from ships in mid-ocean to points inland over the conventional land line system. When such arrangements have been made passengers and officers on vessels at sea may establish contact with those on shore at their homes or offices and speak with them with the same facility and ease that accompanies an ordinary telephone conversation.

Aside from its commercial importance the protection of life at sea is the chief function of marine radio service. That this vital function shall be performed with a degree of reliability exceeded by no other vessel, the installation on the "Leviathan" will permit simultaneous communication by telephone and telegraph. A special emergency set will also be installed. Thus should one or two sets become inoperative due to a mishap, the third or emergency set may be relied upon to summon assistance. Furthermore, two of the life boats are fitted with emergency radio apparatus.

The principal transmitter consists of a high-power vacuum tube outfit which will deliver to main antennae about six times as much power as the apparatus now used on the average steamship. A rapid transfer switch will enable the operator to shift the wavelength of this transmitter in an instant. The second is a duplex telephone outfit which will permit simultaneous telephone and continuous wave telegraph communication. The third or emergency sending equipment is a standard spark set which will normally operate on 600 meters.

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**T**HIS reduction is for the United States only and went into effect Feb. 28th.

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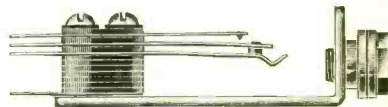


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Automatic  
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The Plug with  
the RED SEAL

**\$1.25**

**The Saturn "PERFECT" Jack**



- No. 1. Single Circuit, Open . . . \$0.50
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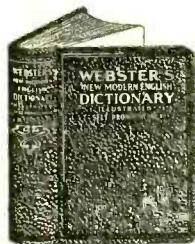
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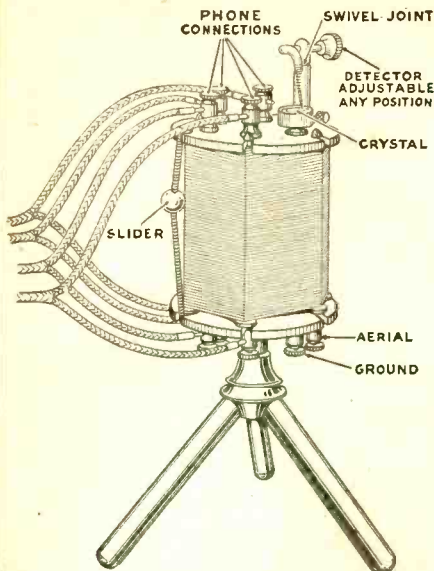
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 LESLIE H. MOULTON MANUFACTURING CO.  
 KANSAS CITY, MO.*

## ADBRIN DETECTOR CRYSTALS

The Adbrin Laboratories are pioneers in the manufacture of Radio Crystals and have established a universal quality trade. All Adbrin Crystals are guaranteed to give satisfaction or money refunded.

**Adbrin Single Mounted in Woods Metal**

Galena .....	Retail, \$0.25 ea.
Silicon .....	“ .30 “
Radiocite (Pyrites) .....	“ .30 “
Trillion Point .....	“ .30 “
Zincite .....	“ .40 “
Eveready .....	“ .40 “

**Adbrin Unmounted Crystals**

Galena .....	Retail, \$0.20 ea.
Radiocite .....	“ .25 “
Silicon .....	“ .25 “

**Adbrin Comba Twin Crystals  
 “Two in One”**

Galena and Radiocite.....	Retail, \$0.40 ea.
Galena and Silicon.....	“ .40 “
Galena and Trillion Point.....	“ .40 “

**DIOLITE INSULATOR CORP.**  
 1050 St. Johns Place Brooklyn, N. Y.  
*Distributors for New York and New England  
 Dealers Write for Prices*

## MARLANITE RADIO PANEL BOARD and MOULDED PARTS

Marlanite has all of the qualities essential to proper insulation of Radio Instruments. Dielectric strength 3/16" over 40,000 volts. Machines perfectly. High polished surface, and is a wonderful panel for the professional and amateur.

**Stock Size Panels**

6 x 12 x 3/16"	7 x 18 x 3/16"
6 x 14 x 3/16"	7 x 12 x 3/16"
6 x 16 x 3/16"	7 x 14 x 3/16"
6 x 18 x 3/16"	7 x 16 x 3/16"
6 x 20 x 3/16"	7 x 18 x 3/16"
6 x 21 x 3/16"	7 x 20 x 3/16"
6 x 22 x 3/16"	7 x 21 x 3/16"
6 x 24 x 3/16"	7 x 22 x 3/16"
8 x 18 x 3/16"	7 x 24 x 3/16"
8 x 20 x 3/16"	Special Sizes up to
8 x 24 x 3/16"	21 x 24"

1/8", 3/8" and 1/2" can be furnished on request.

If your dealer cannot furnish, write us.

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